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BRITISH MEDICAL JOURNAL

LONDON SATURDAY FEBRUARY 17 1945

INFLUENZA EPIDEMICS AND THE INFLUENZA VIRUSES*

BY

C. H. STUART-HARRIS, M.D., F.R.C.P.

Lieut.-Col., R.A.M.C.

LECTURE I

"Influenza virus A" is the name given by general consent (Horsfall *et al.*, 1940) to the virus originally discovered in 1933 by Wilson Smith, Andrewes, and Laidlaw, who demonstrated that garglings from cases of human influenza would produce a transmissible disease in the ferret. It has since been recovered in many different countries all over the world, and it is now known that there is a group of "A" viruses the individual members of which differ in their antigenic structure but share certain characters; a serological relationship exists between these viruses and the virus of swine influenza, discovered by Shope in 1931. Influenza virus B resembles virus A in many of its properties, but is less pathogenic for the ferret and is absolutely distinct in antigenic make-up. The first virus B strains (Lee and T.M.) were recovered almost simultaneously by Francis and Magill in 1940 in the United States, and, although only a few strains have yet been recovered, it is already clear that a group of viruses exists as in the case of virus A, and that the individual members of the group are more or less closely related to each other. No relation apparently exists immunologically between the groups of A and B viruses.

Methods of Study of Human Influenza Virus Infection

The recovery of influenza viruses in the secretions from nose, throat, or lung, which succeeded well in the first few years after the discovery of virus A, has frequently failed in influenza outbreaks since then, and is not applicable to the majority of cases of virus B influenza. Nevertheless, methods based on recovery of the virus are both convincing and essential to the study of the antigenic make-up of the viruses concerned in different outbreaks, and ferret inoculation and observation remain the classical method. Should inoculation fail to induce signs of infection in the ferret, the development of specific antibodies may yet be observed and furnish useful confirmatory evidence of infection in this animal (Horsfall *et al.*, 1940; Stuart-Harris, Glover, and Mills, 1943). Direct inoculation of chick embryos with filtered human garglings, though successful in the U.S. and Australia, has largely failed in this country, possibly owing to the effect on the embryos of wartime conditions of poultry-raising. Indirect methods of demonstration of virus infection depend on the fact that a sharp increase in titre of antibodies occurs during the course of the illness as measured either by antibodies capable of neutralizing the pathogenic effects of the virus or by complement fixation, or by antibodies capable of inhibiting red-cell agglutination by the virus in the test-tube. The latter method of Hirst (1942) is now universally established as the most practicable means of examining large numbers of sera, and has given excellent results even in the type of influenza most difficult to establish by direct methods—namely, influenza B (Stuart-Harris, Glover, and Mills, 1943). The variable level of antibodies before the occurrence of infection, and technical difficulties, make it essential that a simultaneous examination be made of two sera from each patient—one collected during the first few days of fever, and the second on the eighth to fourteenth day in convalescence. Most observers agree that if a fourfold or greater increase in titre of antibodies develops during the course of illness, influenza virus infection of the appropriate type may be presumed.

Influenza Epidemics in Great Britain from 1932 to 1944

The behaviour of influenza viruses in relation to human epidemics in this country has now been studied in varying degrees of detail over a period of 12 years, which included three years with major prevalences of influenza and four years of minor outbreaks. I shall refer to the Registrar-General's figures for notification of deaths from influenza in the 120-odd great towns of England and Wales with a population of over 50,000, partly because no figures are available for the incidence of simple influenza in the community, and partly because these statistics undoubtedly mirror the incidence of outbreaks in the population at large.

Chart I shows the weekly deaths throughout the year for the three seasons of 1933, 1937, and 1943 with major prevalences of influenza, and illustrates the remarkable similarity between them. These were the winters when influenza virus A$_0$ was readily demonstrable in the throats of the victims by ferret inoculation and when strains of

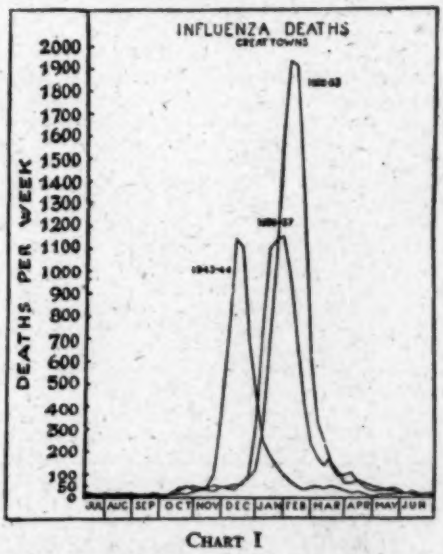

CHART I

virus were subsequently established in the mouse with varying degrees of success. They were the winters when spreading epidemics of influenza occurred in all parts of the country and affected a considerable proportion of the population as well as the semi-isolated communities in which our studies were largely conducted. The British Institute of Public Opinion (1944) estimated that as many

*An abridgment of the Goulstonian Lectures delivered to the Royal College of Physicians on Jan. 16 and 18, 1945.

as 27% of individuals were confined to bed during the period of prevalence of the epidemic in the winter of 1943. Hoyle (1944) estimated, on the basis of complement-fixation studies, that during the same epidemic about 25% of the population were infected with virus A. We do not know the exact time-relationship between the peak of the outbreaks of uncomplicated influenza and the curve for death rates, but it seems probable that the former preceded the latter by two to three weeks in view of the lag between the onset of infection and death and the fact that deaths also occurred from post-influenzal pneumonia. Such an interval was found by Stocks (1944) when he compared the morbidity statistics for Service personnel admitted to E.M.S. hospitals with the curve for deaths for the whole country. The serological tests carried out in the years 1937 and 1943 indicated that at least 80%, and probably more, of the cases of influenza were associated with virus A activity, and no considerable residue of cases unassociated with this virus therefore occurred.

Chart II shows the four years 1934, 1936, 1938, 1942, and early part of 1943, when the notifications gave no indication of influenza outbreaks. In these years either influenza did not break out at all or else local prevalences which were mild and ill defined occurred. A solitary family outbreak in 1934 yielded virus A in the ferret. Several Service outbreaks in the spring of 1936 yielded no evidence of virus A, and were labelled "febrile catarrh" because of the clinical differences from the 1937 virus A cases. No outbreaks were reported in 1938 or in 1942, and in the latter year sporadic cases of clinical influenza in an Army garrison gave no serological changes either to virus A or to virus B. In Jan. and Feb., 1943, months when influenza deaths exceeded 100 in one week, a small increase in sporadic cases of influenza was encountered in two Home

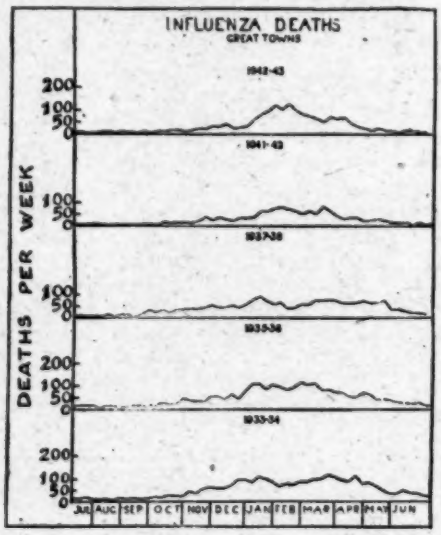

CHART II

Divisions, and one unit experienced a small but explosive outbreak. We found serological evidence of virus B infection in these cases but failed to recover virus (Stansfeld and Stuart-Harris, 1943). The existence of virus B infection was also established serologically in sporadic cases of influenza in London and elsewhere, and Himmelweit established one strain in ferrets from a case of fatal pneumonia (Himmelweit, 1943). However, in this year some 50% of cases, many typical clinically of influenza, yielded no serological response either to virus A or to virus B. Later, in April, 1943, a small outbreak of influenza occurred in an Air Force establishment (Donnelly *et al.*, 1944), and in several scattered outbreaks in summer and autumn. Virus A infection was encountered in tests made at Hampstead (Andrewes and Glover, 1944) on sera from various parts of the country. In this year, therefore, first sporadic cases, then localized outbreaks, and finally a widespread epidemic of influenza A were all encountered.

Chart III shows the figures for the four intermediate years 1935, 1939, 1940, and 1941, when a sustained increase in incidence of deaths occurred between January and March each year yet no sharp peak developed. Localized outbreaks of influenza were recorded in each of these years, but the activity of the viruses was hard to understand. In 1935 two outbreaks in Army garrisons were investigated by Andrewes, Laidlaw, and Smith (1935). In January no virus A was detected in one barracks, yet it was readily recovered in the other in March. Some clinical differences between the cases in the two outbreaks were detected. In 1939 many outbreaks in schools and Service establishments were investigated. A few strains of virus A were recovered, but were difficult to establish in ferrets, and serum tests showed that only 30% of cases were infected with virus A (Stuart-Harris *et al.*, 1940). I could not distinguish clinically between the virus A cases and the others in which infection by this virus was not demonstrable. Following the recovery of virus B by Francis in 1940, the late Dora Lush retested some of our 1939 sera against the virus B strain (Lush *et al.*, 1941). She found several instances of undoubted virus B infection, yet was forced to state that the majority of the sera yielded no better evidence of virus B infection than they had of virus A. In the year 1939, therefore, both virus A and B influenza had occurred

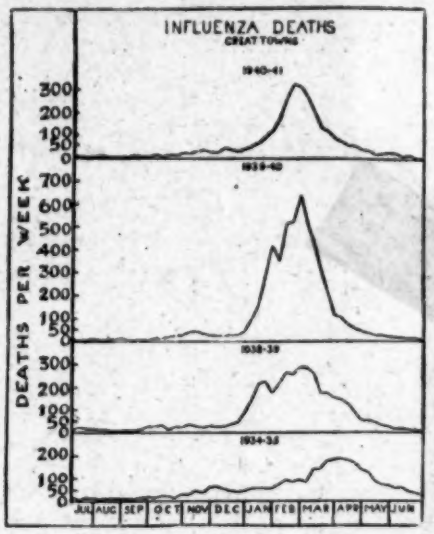

CHART III

but a large proportion of the cases were not demonstrably associated with either virus. Then in 1940, the spring following upon the declaration of war, when mobilization for the Army and evacuation of children had occurred, an unexpected and relatively large wave of influenza-like illnesses was encountered. Owing to the prevailing conditions, attempts to recover viruses directly were the only ones which were employed, and these all proved negative (Andrewes *et al.*, 1941). As no serological tests were made, the outbreaks of this year remain of undetermined aetiology. The last year—that of 1941—will long be remembered by those of us who foolishly imagined that we knew all about the causes of influenza epidemics. It was the winter of the aerial "blitz" on London and the large cities, and it was four years since the previous last widespread epidemic in 1937. When a group of cases in January in Southern England were found to be infected with virus A, and when the virus

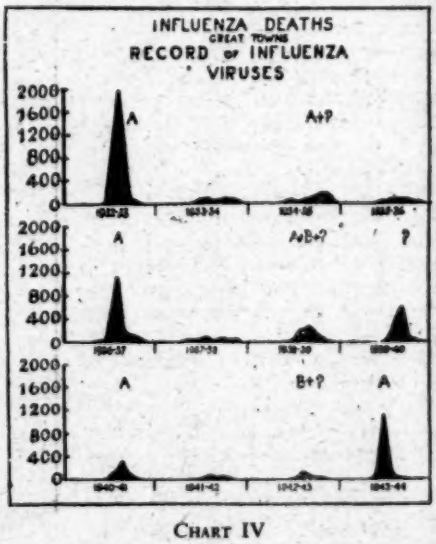

CHART IV

was recovered from garglings from a case of influenza in one of the London shelters, it seemed probable that we were about to witness a serious epidemic. Our gloomy prophecy proved unjustified; no widespreading epidemic developed, and we were spared a disaster at this most critical stage of our history. It is remarkable that the chart for death rates showed clearly the small peak coinciding with the recovery of the virus in the laboratory. Nevertheless, the viruses recovered in this year were characterized by their low pathogenicity

for the ferret, and, although no case yielded evidence of virus B infection, at least 20% of the sera tested this year had no evidence of infection either by virus A or by virus B (Andrewes *et al.*, 1941). In all four years, therefore, and in some of the years without peaks in mortality, the minor influenza outbreaks were either A or B, or A plus B, but, in any case, a proportion of cases, varying in number in the different outbreaks, could not be typed. For these cases, which appear to be neither A nor B, the name "influenza Y" has come into use (Rickard *et al.*, 1941). In these years the concatenation of circumstances which is necessary for a spreading epidemic to develop—that is, the state of immunity of the population, the characteristics of the viruses, and possibly other unknown factors—did not occur, and the virus outbreaks remained localized.

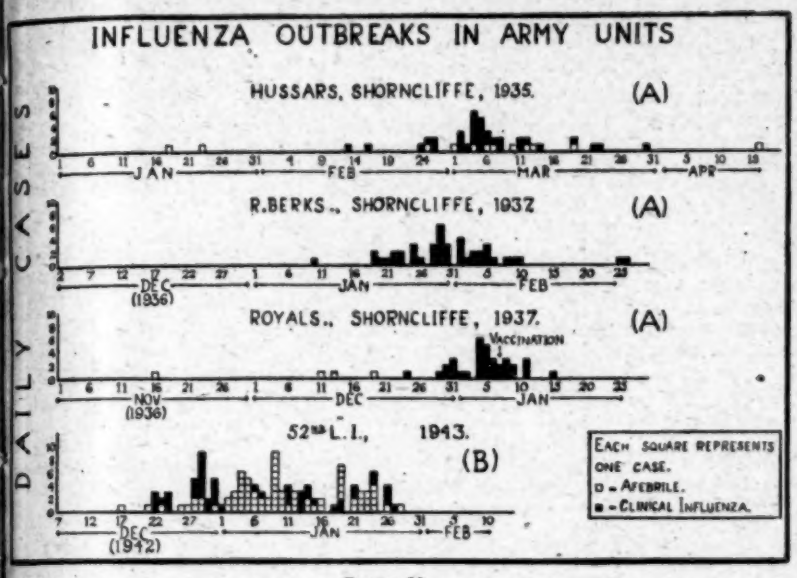

CHART V

Chart IV serves to recapitulate the experience with the viruses in these 12 years and shows in semi-diagrammatic fashion the peaks of mortality from influenza. With the solitary exception of 1943, when cases of virus A influenza occurred in late spring and summer, the records of virus detection in the laboratory which are indicated on the chart represent the only direct evidence of virus activity in these years in Great Britain. No evidence of virus activity or of the presence of virus has been found in between the winter seasons.

Epidemics in Other Countries

Comparison of the experience in Great Britain with that in other countries where studies of influenza virus infection have been made is essential in order to provide us with the proper perspective. Unfortunately, detailed studies have as yet been made in far too few countries for the picture to be anything like complete. Nevertheless, the fact is clear that the majority of widespread epidemics of influenza sweeping through entire countries or continents and causing a rise in the death rate from pneumonia have been associated with virus A infection. Such were the major American and Canadian epidemics of 1937 and 1943, and the smaller prevalences of 1935, 1939, and 1941. These epidemics kept step remarkably with those recorded in Great Britain, and Britain and the North American continent appear to form a closely related epidemiological unit. The virus A outbreaks in Hungary in 1937 and 1939, though coinciding with outbreaks in this country, varied in that much the larger wave occurred in 1939. Also, a widespread epidemic in Russia in 1936, when virus A was identified, occurred at a time when there was no influenza A detectable here. Thus there is some evidence that different parts of Europe experienced their major waves of virus A influenza at different times. Again, the Southern Hemisphere is completely out of step with the Northern Hemisphere. Melbourne experienced major waves of influenza in 1935, 1939, and 1942, and virus A infection was widespread in each of the latter two years. The Argentine had an outbreak of influenza A in 1940, and all these outbreaks in the Southern Hemisphere occurred at the coldest period of the year, between June and September.

Virus B appears to differ from virus A in that it is often not associated with large epidemics. Taylor and others (1942), in recording respiratory infection at a naval establishment in the Argentine, commented on the fact that influenza B occurred in 30% of cases in small waves scattered over several weeks. In Victoria sporadic cases of influenza B occurred in 1943 (Beveridge and Williams, 1944), and in Canada in 1943 was recorded a remarkably similar experience to that in this country, with evidence of 30% case-incidence of influenza B in small prevalences in different parts of the Dominion (Hare, Stamatis, and Jackson, 1943). Nevertheless, the initial recovery of virus B was made in the Eastern United States in 1940 at a time when an influenza epidemic of some size was in progress, and outbreaks associated with virus B also affected California in 1936 and 1940 in widespread fashion. While virus B is thus more often than not associated with sporadic cases of influenza, it has at times been associated with large epidemics.

In addition to outbreaks when either virus A or virus B has been detected, various workers have recorded localized mixed outbreaks in which infection by either virus predominated but was accompanied by a variable proportion of sporadic cases due to the other virus. Such were the outbreaks in the United States and West Indies described by Lennette in 1940 and 1941. In these epidemics there were also some cases from which viruses were not recovered and which were unaccompanied by serological change to either virus. These remained in the unclassified group of influenza Y, whose percentage incidence varied widely. Even in the absence of an outbreak, sporadic cases of either influenza A or influenza B have been recorded from time to time. Workers in Australia (Beveridge and Williams, 1943) were particularly struck by the occurrence of sporadic cases of influenza A in 1943, when the incidence of total respiratory infections in various Army camps was too low to be described as epidemic. Sporadic A cases were also encountered in Canada (Hare, Hamilton, and Feasby, 1943) and in the United States (Salk, Menke, and Francis, 1944) in the spring of 1943. Such may merely have been the forerunners of a sequence of events preceding an actual epidemic, as in our own case in the same year, but it is clear that at

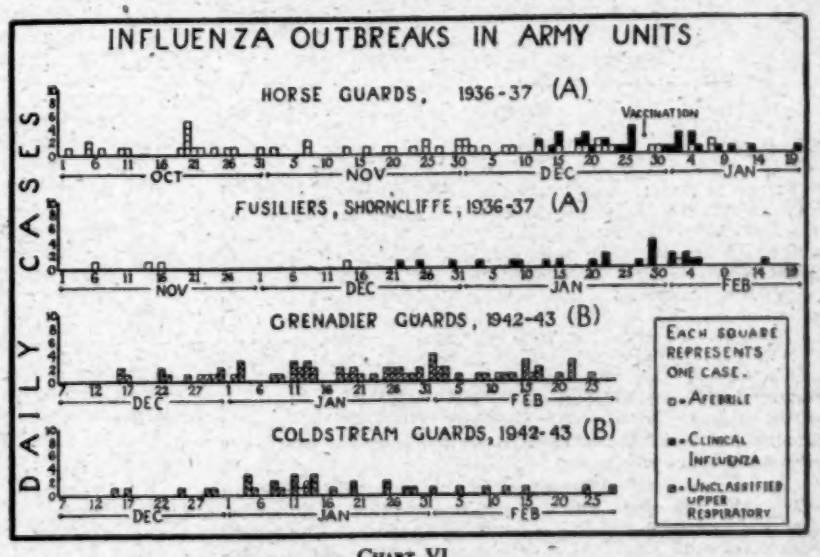

CHART VI

other times sporadic cases have not necessarily presaged an epidemic within a short period of time.

Form of the Influenza Outbreak

When the actual form of an outbreak of influenza in a semi-isolated community is studied, almost every conceivable variation is seen. Chart V shows the sharply peaked type of outbreak seen in regiments not subject to any considerable change of population. The first three of these outbreaks were due to virus A influenza in preponderance and affected 10 to 15% of those at risk, and a proportion of the cases in the fourth outbreak yielded virus B. The large number of afebrile cases in the latter epidemic was noteworthy, and altogether some 13% of the unit were affected. Both viruses have, however, been associated with straggling outbreaks even in the same years as those in which the sharply peaked outbreaks were encountered (Chart VI). The blame for such prolongation of the epidemic wave could not in these cases be laid upon considerable changes in the population at risk, but it is known from other studies that such changes do in fact exert a potent influence on the curve of the epidemic. Thus, in the Services, outbreaks of influenza provoke an unequal incidence of the disease upon the various members of the herd unit, those with lowest total service or shortest duration of residence in the herd being most affected. The accompanying Table shows the

Table showing Incidence of Influenza during Epidemic of 1937 (January to March)

Establishment	Group	No. at Risk	Ages	Influenza (%)	Total Minor Resp. (%)
Chatham Naval Barracks	Recruits	1,440	18–20	12·7	28·2
	Trained men	5,731	18–20	3·8	5·6
Shotley, R.N.	Recruits (boys)	2,005	16	26·7	44·9
	Ship's company	471	—	7·9	10·1
Portsmouth, R.N.	Recruits (boys)	815	16	35·6	53·4
	Ship's company	277	—	6·5	11·9

figures of incidence in Jan.–March, 1937, among men and boys at the Chatham Naval Barracks, when a high proportion of tests in the establishment and elsewhere showed virus A influenza. The recruits with less than 12 months' service suffered five times as heavily as the trained men with over 12 months' service. Similar results were seen at Shotley and Portsmouth Barracks, where trained men furnishing the ship's company had only one-fifth the amount of respiratory infection as had the boy seamen. It is tempting to relate the very high incidence in the boy seamen to the fact that in these establishments monthly intakes of raw recruits occurred and the boys spent only 9 months at each depot. Dudley (1926) has emphasized the paramount importance in droplet infection of the factor of rate of change of population, which is interlinked with the rate of addition of new members to the herd and the duration of residence of each member in the herd. Again, Topley (Greenwood *et al.*, 1936) showed in his experimental epidemics of mouse typhoid and pasteurellosis that without any change in virulence of the organism concerned, waves of renewed epidemic prevalence in the herd could be brought about merely by adding fresh uninfected susceptibles at a steady rate.

It is in the Service training establishments that premonitory waves of the minor respiratory infections, which are always at a higher level than in the population at large, appear sometimes to lead up to actual epidemics of influenza. Possibly this is because the frequent population changes cause frequent interchange of respiratory pathogens and resultant increase in virulence of the agents concerned. Thus at Chatham, in 1936, a definite wave of some respiratory infection not associated with virus A preceded the January wave, when virus A was recovered. Also at the same barracks, in 1939, the January wave, which yielded neither virus A nor virus B, was succeeded after an interval of time by the occurrence of genuine cases of infection with both viruses. A Canadian camp near Toronto experienced three waves in the winter of 1942–3, of which the first was not associated with either A or B, the second consisted of some cases of B, and the third was of virus A influenza (Hare, Hamilton, and Feasby, 1943). Once, however, virus A has again become active, it does not follow that a general epidemic will result immediately, as shown by the recent experience last year. Although virus A was then demonstrated in localized outbreaks in Canada, the U.S.A., and Great Britain in the spring of 1943, and in the last-named country a series of small outbreaks followed during the summer, it was not until the autumn that conditions were ripe for the rapid wave of infection which characterizes a real epidemic of influenza, and this then occurred throughout the population.

This problem of the genesis of an influenza epidemic which is linked with the mode of existence of the virus in between outbreaks has not been solved. There are four possible ways in which the virus could bridge the gap of its existence between epidemics.

First, it might exist by means of a continuous chain of outbreaks so that always somewhere in the world there is an outbreak or a series of sporadic cases which keeps the virus alive. The general failure to demonstrate the virus in sporadic cases in non-epidemic times must be taken into consideration here. Also, the remarkable way in which over wide areas the viruses may suddenly become active at almost exactly the same time, as happened in 1943, does not suggest that the epidemics in different countries arise by spread of infection from one country to the next. However, the study of isolated communities, as at Spitsbergen or in Greenland, certainly suggests that infection may at times be introduced from outside the community and initiate an epidemic.

Secondly, the virus may live in the nose or throat of healthy carriers in between outbreaks. It has certainly been demonstrated in healthy carriers during an epidemic, and one outbreak of influenza A in an isolated community in Alaska (Pettit, Mudd, and Pepper, 1936) was traced to the arrival of three travellers, themselves unaffected, by 'plane from an area where an influenza epidemic was in progress. Between outbreaks, however, the virus has not been found in healthy persons. Shortly before the war I began to examine tonsils removed at operation from children. In this small series of tests ferrets inoculated with emulsions of the glands failed to show evidence of virus infection. An enormous number of such tests would of course have to be made before negative results could be considered significant.

Thirdly, the virus might transfer its activity to an animal host acting as a reservoir in between human epidemics. It is difficult to know what animal might serve in this capacity, for ordinary laboratory and domestic animals, with the exception of the pig, are not truly susceptible to the virus. In the pig, which has its own particular variety of influenza virus as parasite, the human influenza virus A induces only a very mild disease (Shope and Francis, 1936). The facts that cases of swine influenza in Great Britain have been found to yield strains of virus more closely related to virus A than to the American strain of swine virus (Glover and Andrewes, 1936) and that Shope (1938) found serological evidence of natural infection of pigs with virus A during an outbreak of human influenza may perhaps indicate that under certain conditions the human influenza virus passes from man to the pig.

Fourthly, the virus might exist between epidemics in an unrecognizable form. Such a view was suggested by Andrewes (1942), who postulated the origin of influenza epidemics by the successive mutation of grades of influenza virus. Andrewes thought that sporadic human influenza might be due to a " basic " or rough form of virus devoid of its specific antigen, of animal pathogenicity, and of the power of producing the serological changes due to the normal antigen. This virus would certainly be undetectable by present laboratory methods. Sudden mutation induced by frequent human passages was thought to cause the transformation of basic virus into virus A or B, with characteristic antigen and animal pathogenicity.

Another unrecognizable form of influenza virus has in the analogous disease of swine been clearly demonstrated to be the mode in which the virus persists between outbreaks. Shope (1941) has shown that in swine influenza the virus is already present in masked form in the pig's lung, attached to the lungworm which is such a frequent parasite of the pig. It appears that virus from pigs suffering from swine influenza passes to the exterior via the ova of the lungworm, which are coughed up, swallowed, and pass out in the faeces. The ova develop further into larvae in the earthworm, and when the latter are swallowed by pigs they develop by passing to the lung and are there established. They do not give rise to influenza at once, but by some sort of trigger mechanism, such as change in meteorological conditions, or by artificial means such as repeated intramuscular injection with *Haemophilus influenzae suis*, the dormant virus is activated and the pig develops influenza. An analogous path to the tortuous progress from pig to pig via the lungworm ova and the earthworm could

hardly be conceivable in the case of human influenza, but the general conception of a dormant phase of influenza virus remains as a possible explanation. Epidemics would then arise in communities from virus already seeded but present in a sleeping phase, and would develop because of some changed conditions, perhaps of a meteorological nature, which released the virus from its sleep and caused it to become active once again. These, then, are the various possibilities, and more cannot be said as to which is nearest the truth. It must be admitted, however, not only that the solution of this problem is a matter of academic interest but that it has important practical considerations.

Clinical Manifestations of Influenza Virus Infections

1. Influenza A

As a result of the correlated clinical and laboratory studies made in Britain during the 1937 epidemic (Stuart-Harris *et al.*, 1938) it was thought that the infection produced by virus A could vary from an extremely mild illness through increasing grades of severity to a rapidly fatal pneumonia. It was also considered, as a result of observation of the sera of individuals in contact with cases of influenza but who did not themselves show clinical signs of infection, that subclinical attacks were possible, and probably of frequent occurrence. The results of many studies by different observers all over the world since 1937 have agreed with these views, though little fresh has been added to the clinical data of infection during an epidemic assembled in 1937. Study of the effects of deliberate infection of human volunteers with virus A by Smorodintseff and others (1937), by Burnet and Foley (1940), and by Henle, Henle, and Stokes (1942) has also strengthened the view that the virus is the essential agent in the production of the clinical phenomena observed during an epidemic. The cases which would be recognized by most clinicians as worthy of the diagnosis of influenza thus appear to be merely infections of a particular degree of clinical severity, and are almost certainly outnumbered during an epidemic by subclinical infection and by other cases so mild as to be clinically indistinguishable from endemic colds and the minor maladies of the respiratory tract. Nevertheless, groups of uncomplicated cases of influenza due to virus A do furnish a clinical picture whose recognition from one epidemic to the next has been possible. The picture in the healthy soldier with a typical attack of influenza is as follows:

The patient, usually in good health, is suddenly seized with a headache, and begins to feel shivery and ill. He sleeps poorly, waking at intervals with a cough or with aching in the back or limbs, and in the morning is unfit for duty on account of weakness and fever. He may feel dizzy on rising, may actually vomit or faint. The temperature is usually 100° at this time, and rises steadily to 101° or 102° during the day, symptoms being at their height by the evening. Frontal headache, muscular pains, anorexia, drowsiness, and a desire not to be disturbed are the chief symptoms, but a dry cough, blocked nose, and perhaps sneezing indicate that the respiratory tract is involved. The patient now has a rather characteristic appearance: the face is flushed and slightly bloated, with circumoral pallor and slightly cyanosed lips; the eyes are glistening or slightly injected with excessive secretion and are in part concealed by the eyelids, which droop a little. Apart from fever, and a normal or only slightly elevated pulse rate, nothing much can be made out on physical examination. The tongue is coated with white fur; the nasopharynx is dry, with dilated capillaries; and a rhonchus or group of rales may be heard in the chest, particularly over the lung bases. The next day the temperature has fallen or has begun to fall, and the patient feels much improved. Cough, however, continues, perhaps with pain in the region of the larynx or substernum. The throat may be sore on swallowing and the nasopharyngeal adenoid tissue is swollen. On the third morning there is often a renewal of fever and a return of headache and muscular aching; cough continues, with production of small pellets of mucoid or mucopurulent sputum; and the voice may be a little hoarse. The lung bases may show patches of weak breathing and fine rales, but percussion is not impaired, and a skiagram shows no abnormal shadows. Fever subsides after three to five days, and the patient rapidly becomes convalescent, though with cough and slight sputum continuing, and perhaps a tendency to instability of the temperature chart. The leucocyte count remains within normal limits (4 to 14 thousand per c.mm.) throughout the disease, and the relative percentage of the various white cells is not abnormal. Post-influenzal debility and depression are not features of convalescence in soldiers, who are usually fit for duty by the end of the week or the ninth day. Less fit subjects undoubtedly experience these sequelae, and the cough may also take longer to clear up than in fit men. Variations from this typical case, with onset following a premonitory cold, with frequent vomiting on the first day of illness, with more catarrhal symptoms such as acute coryza or a very sore throat, or aphonia, have been encountered, and the temperature chart varies widely. Afebrile cases and very trivial fevers are seen, and many of the 3–5-day fevers have diphasic curves. Prolonged cases of fever usually show persistent physical signs in the chest, and thus grade naturally into cases of influenza complicated by chest involvement. Such cases were divided by Scadding (1937) into three categories, and though his study was based on the civilian population, his findings agreed in the main with our own results on soldiers.

(i) The first group consisted of cases without clinical signs of lung involvement in which there was pharyngitis and tracheitis corresponding to the typical case just described.

(ii) The second group comprised cases with lung signs but without consolidation. These corresponded to cases with bronchitis and bronchiolitis which showed all the usual symptoms of influenza but in addition had areas of diminished movement, perhaps impaired percussion note, weak or suppressed breath sounds, and fine or medium rales scattered in patches usually at the lung bases. In spite of the abundance of physical signs in these patients, skiagrams of the chest showed only vague shadows, which were never as well defined as the clinician expected. It is presumably this type of case which is referred to by some as primary atypical pneumonia due to influenza virus. Apart from the fact that the majority of cases of atypical pneumonia as described in recent outbreaks (Dingle *et al.*, 1944) show *x*-ray abnormalities in excess of clinical expectations, most cases of influenza certainly do not exhibit abnormal *x*-ray appearances. The pathological lesion produced by influenza virus in experimental animals is essentially a necrosis of the epithelium of the finer bronchioles (Straub, 1937), and I would therefore suggest that the majority of the human cases of influenza belonging to this group probably have a bronchiolitis rather than a true involvement of the alveoli.

(iii) Cases with demonstrable consolidation furnished the most severe and also the most baffling of all the variations of the virus infection. The history was that either in continuity with the symptoms of influenza or more usually on the fourth or fifth day, or after a brief interval of a few days from the end of the attack of influenza, pain in the chest and increase in cough and expectoration heralded the development of a lung complication. The course of the pneumonia which followed was recognizably different from that of lobar pneumonia or, for that matter, from other forms of pneumococcal pneumonia. Though this is not the place to enter into detailed descriptions of resemblances and differences, it should be emphasized that the most fulminating cases seen in 1937 were essentially similar to the fulminating pneumonia of 1918 but occurred only rarely, and that a fatal pneumonia was chiefly limited in incidence to the very young and the very old.

The investigations which have thus so far been made on cases of influenza complicated by chest involvement have failed to elucidate the exact relationship of the virus to the pathological changes in the lung. The recovery of virus from cases of influenza with bronchiolitis proved consistent enough in 1937 to indicate that the virus infection coincided with the bronchiolar involvement. In cases of pneumonia, however, the virus was rarely recovered from garglings or sputum by the time that lung signs had developed, though it was recovered, in common with *Staphylococcus aureus*, from the lungs of three rapidly fatal cases (Stuart-Harris *et al.*, 1938). Also, some of the cases of pneumonia already had a high level of neutralizing antibodies in the serum by the time that pneumonia existed, which seemed to indicate that the virus infection often preceded the lung involvement. Hitherto, in this discussion, little attention has been paid to the role of bacteria in the production of disease during an epidemic. In swine influenza the virus alone produces only a mild disease, and simultaneous infection by the virus and the pig variety of *Haemophilus influenzae* is necessary for the full reproduction of the natural disease, which includes consolidation of the lungs. In human influenza the virus alone appears to be fully adequate to produce the uncomplicated disease, but the evidence favours the view that secondary bacterial invasion is necessary for pulmonary involvement, at any rate with the type of human virus known to us in the laboratory. The exact species of bacteria varies in different patients. The pneumococcus is far and away the commonest type to be found either in the pneumonia accompanying or in that which follows virus A influenza. The *Staphylococcus aureus* appears, however, to be particularly important in fulminating types of pneumonia, and a necrosing bronchiolitis and multiple abscess formation are found in such cases at necropsy (Scadding, 1938; Finland *et al.*, 1941). It

may be that the rapidity with which patients with this type of pneumonia die favours recovery of virus from the lung, for fatal cases of pneumococcal pneumonia usually live longer than staphylococcal cases, and virus is not usually recovered from the lungs of pneumococcal cases at necropsy. Disappearance of virus from the lungs of ferrets also occurs at an early stage of infection, and by the sixth day, in spite of the presence of lung lesions, the virus may no longer be detectable by subinoculation to other ferrets. The haemolytic streptococcus has been extremely uncommon as a secondary invader of recent years, and the role of the *Haemophilus influenzae* in pulmonary cases has not been at all clear, although the organism has often been found in the sputum of all types of the disease. Thus it seems clear that the lung consolidations which have been encountered in recent epidemics have not been due to virus alone, although the virus is fully capable of producing lung lesions in the experimental animal and, in any case, may in some way destroy the defence mechanism against bacteria. The possible influence of bacterial infection on that due to the virus, by aiding spread of the virus in the lung, as suggested by Taylor (1941), must also be taken into account. It may be that the current strains of virus, as Burnet and Clark (1942) have suggested, limit their attack to the bronchioles of man, but that only a slight modification of their power of spread down the respiratory tract, with actual involvement of the alveoli, would be needed to enable them to produce a much more lethal type of disease. Meanwhile the remarkable way in which the curve of deaths from pneumonia follows the outbreak of the simple virus disease in the population must indicate an extremely close relationship between the virus and the pathological conditions in the lung, however these may be produced.

2. Influenza B

The only detailed studies of the clinical picture of influenza B which have been made agree in general in finding that there are few differences between the typical attacks of influenza B and those of A. Stansfeld and I in 1943 saw several groups of cases of influenza B and, both by the bedside and by retrospective analysis of symptoms and signs, were unable to differentiate the cases from those of influenza A seen in other years. The majority of the cases were febrile, and the same variation in duration of fever was seen as in influenza A. Cases complicated by lung involvement were not common, and skiagrams of the lungs of cases taken at an American Army laboratory were not abnormal. Other observers have reported a tendency for influenza B to be more insidious in onset than influenza A, often with a premonitory cold (Hare, Hamilton, and Feasby, 1943 ; Beveridge and Williams, 1944) ; and a greater tendency for the symptoms of an acute cold to accompany the fever was noted by Nigg and others (1942) in Minnesota and by Hare, Stamatis, and Jackson in 1943. Some afebrile cases with the same serological changes as febrile ones were encountered by Hare and co-workers in 1943. A number of cases seen by the latter were described as showing the *x*-ray findings of atypical pneumonia, but it seems possible that the high incidence of this syndrome may have been related to the occurrence of numbers of cases of atypical pneumonia in a respiratory wave preceding the occurrence of influenza B. In our own outbreak, cases of influenza B did not show the *x*-ray appearances of atypical pneumonia, and sporadic cases of the latter syndrome occurring at the same time of year as the influenza did not reveal serological changes of influenza virus infection. True consolidation of the lungs was not encountered by us during the prevalence of influenza B, but in the outbreak described by Nigg in 1942 a number of cases of pneumonia from which pneumococci were isolated occurred coincidently with the cases of influenza. Also, Himmelweit in 1943 recorded a fatal case of pneumonia in which the lung contained both virus B and enormous numbers of *Staph. aureus* at necropsy. It does seem probable, however, from the combined experience of influenza B in all parts of the world, that pneumonic complications occur less commonly than in influenza A. Evidence of subclinical infection during an outbreak of influenza B (Nigg *et al.*, 1942) has been obtained as in influenza A, and study of deliberate infection experiments in humans by Francis and others (1944) indicated that subclinical infection can indeed occur among the healthy contacts of individuals infected with the virus.

Differential Diagnosis of Virus Influenza, Sporadic Influenza, and Influenza Y

It has been said that typical attacks of influenza A are recognizable clinically from one year to the next. Yet the variation between the cases is so great that recognition of the disease in the individual is impossible. Furthermore, if groups of cases of sporadic influenza occurring in non-epidemic seasons at times of the year and not demonstrably associated with either virus A or virus B are compared clinically with groups of virus influenza, sharp distinction cannot be made (Rickard, Lennette, and Horsfall, 1940). Even during actual outbreaks many cases are seen in which the diagnosis of influenza may be made at the bedside, yet no serological evidence of either virus A or virus B infection can be obtained and the viruses cannot be demonstrated in the human secretions. It is this group of cases of clinical influenza referred to already as influenza Y which provides us with a still unsolved problem in aetiology. The percentage of cases of influenza Y varies greatly in different outbreaks, being least in years of large-spreading outbreaks of influenza A and greatest in years of ill-defined outbreaks of influenza B or of mixed A and B infection. Stansfeld (1943) attempted to differentiate the cases without serological change from the neighbouring cases of influenza B, and compared them with the cases of influenza A which I had collected in various years. There were no sharp differences between the three groups, and this experience agrees with our own in 1939, with the findings of Lennette (1941), of Taylor (1942), and of Hare (1943). In 1943 influenza Y comprised some 43% of our cases, but 70% of influenza Y cases was found in outbreaks in Canada (Hare, Stamatis, and Jackson, 1943) and in the Argentine (Taylor *et al.*, 1942).

Although various observers have speculated on the aetiology of influenza Y, it is certain that we do not at present know the answer to this riddle. The various theories may be briefly mentioned. First, there is the obvious theory that these cases are due to a third type of influenza virus so far undiscovered. Secondly, influenza Y may be due to the basic form of influenza virus in its "rough" state without specific antigen, as postulated by Andrewes (1942). Thirdly, there is the theory that these cases are really infections by either virus A or virus B but that for some reason there has been a failure of serological response, or that our methods are too crude to detect the rise. Evidence for this has been brought forward by Rickard and others (1941), who found that cases of influenza Y possess in their sera in the acute stage of illness a higher content of neutralizing antibody to either virus A or virus B than cases of virus influenza in the same outbreak. It is known that the smallest proportional increase in antibody occurs among individuals with a high level of antibody before infection, and therefore it is conceivable that such antibody increase as does occur in the influenza Y cases is undetectable by our present crude methods. Francis (1944) also encountered cases of infection following deliberate instillation of virus B in which, in spite of a good clinical reaction, serological change was trivial or absent and the virus was not recovered from gargling. Another possibility is that these cases are due to antigenically different strains of the same A or B virus. Magill and Sugg (1944) have pointed out that if a large number of different strains, especially of viruses isolated during an outbreak, are employed in the tests of sera from the same outbreak more cases will be found to show antibody response to at least one strain than if only one strain is used in the test. My personal view would incline me to the belief that another virus, or other viruses, as yet unknown, are the cause of at least some of the influenza Y cases in an outbreak. It would seem logical that if virus B differs from virus A in being much less pathogenic for the ferret, other viruses capable of producing influenza in man exist which are still less pathogenic for the ferret than virus B. The antibody estimations carried out on the cases of influenza Y by us (Stuart-Harris, Glover, and Mills, 1943) showed these cases to occur slightly more often among the groups with high initial antibodies to virus B (Chart VII). Cases did occur with all grades of B antibody, however. The influenza Y cases were also distributed in time throughout the epidemic, though with less incidence in the first two weeks of January, when virus B infection was relatively commoner. Until some method is found of recovering virus from these

individuals, however, the aetiology of influenza Y must remain undecided.

Certain Other Respiratory Diseases Unrelated to Influenza Virus Infection

Francis, in an address in 1937, when discussing the differential diagnosis of influenza said it was easier to describe what influenza was not than to define what it was. This point of view certainly appeals to me, and one seems to be on reasonably certain ground in stating that influenza is not the endemic afebrile cold, is not streptococcal tonsillitis, and is not primary atypical pneumonia. Nor, in recent years at any rate, has it been a gastro-intestinal disease. However, it is certainly true that during an epidemic both influenza A and influenza B can mimic the common cold, and one feels that the common cold virus will eventually be found to be related to the group of influenza viruses and that at times it may cause attacks of clinical influenza. More cannot be said in the absence of knowledge of the antigenic make-up of the common cold virus or until some more reasonable way is found of working with the virus than by studying its effect in the chimpanzee (Dochez *et al.*, 1930). Streptococcal tonsillitis stands more clearly apart from influenza than any of the conditions previously discussed, but there are some cases of exudative tonsillitis in which the haemolytic streptococcus is not concerned that may occur side by side with other cases more clearly resembling clinical influenza. The febrile sore throat or pharyngitis of the medical inspection room does not seem to be influenza, and yet may at times be extremely difficult to distinguish from it. There is a greater tendency for pharyngitis to be accompanied by severe laryngitis and tracheitis, and the name "febrile catarrh," though now discarded, may yet be found to be of use when our knowledge of the virus and bacterial infections of the upper respiratory tract is more complete. The group labelled "primary atypical pneumonia" includes examples of infection by viruses of the psittacosis group (Meiklejohn *et al.*, 1944), but a majority of the cases are of undetermined aetiology.

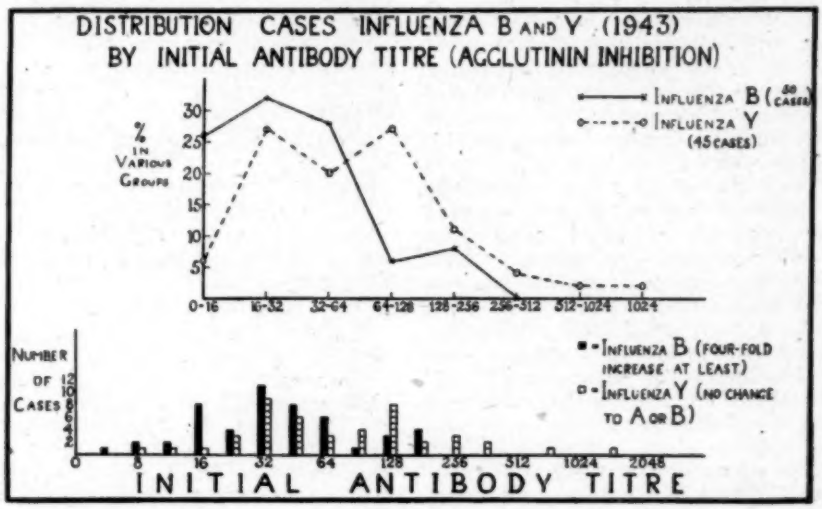

CHART VII

On purely clinical grounds, atypical pneumonia is readily confused with influenza in view of the occurrence of fever, constitutional symptoms, and signs of respiratory-tract infection in both conditions. The onset is more often insidious, the fever lasts longer on the average, and the cough is more often paroxysmal, irritating, and accompanied by substernal discomfort in the case of atypical pneumonia. The characteristic veiled shadows spreading out from the hilar regions which are seen in skiagrams of the chest in atypical pneumonia at once distinguish the condition from simple influenza. Also, the fact that there is more to see in the *x*-ray picture than one would expect from examination of the chest should help to differentiate atypical pneumonia from influenza with bronchiolitis. The discovery of the rise in titre of cold agglutinins for human red cells (Peterson, Ham, and Finland, 1943) which occurs in the serum of many cases of atypical pneumonia during convalescence may be of use when the serological tests for influenza cannot be applied. Further clarification and definition of the atypical pneumonia syndrome from influenza must, however, await, as in the common cold, exact knowledge of the aetiology of the condition. The studies of Eaton *et al.* (1944) on the pulmonary disease in cotton-rats and hamsters induced by sputum from cases of atypical pneumonia deserve special mention in this connexion. In the meantime, the careful studies in progress in the United States (Commission on Acute Respiratory Diseases, U.S. Army, 1944) have led to a recognition of the commonness of the disease, its high incidence in Army recruits, and its almost constant ratio of 10% of the total undifferentiated minor maladies of the respiratory tract in Service personnel.

The Possible Relation between Virus Influenza and Pandemic Influenza

I cannot conclude without a few remarks on the possible relationship between influenza epidemics such as those which I have described and the type of influenza responsible for the 1918 pandemic. Dwight O'Hara (1944) has recently suggested that we owe our present freedom from devastating influenza epidemics to the annual or biennial recurrence of fair-sized outbreaks. A mere glance at the incidence of influenza since the middle of last century is enough to give a bold negative to this theory. The freedom from influenza which prevailed for nearly 50 years after 1847 was, it is true, followed by the pandemic of 1890. But ever after this we have experienced a much greater prevalence of the disease than before 1890, and experience in distant parts of the world, such as Australia, has been much the same. The wartime years which preceded the 1918 wave, far from being years of low prevalence of influenza, were actually periods in which pneumonia mortality and respiratory infections in general increased steadily each year. In the present war, and in spite of unprecedented overcrowding and movement of population within this country, the epidemics have been, if anything, milder than in pre-war years, and there is no suggestion that we are likely to experience the return of a pandemic such as that of 1918. Abler workers than I have speculated upon the relationship between influenza viruses and pandemic influenza, and Burnet and Clark (1942) have given an admirable survey of the possibilities. Analogy between virus A influenza and the pandemic variety breaks down even if only the mild summer wave is considered. For though the three-day fever of June, 1918, was very similar clinically to virus A influenza, the occurrence of a much higher mortality in the young adult of 20 to 30 even in the first wave in 1918 indicates some fundamental difference. The later waves in 1918 not only showed the same trend in age mortality as did the first wave but suffered an incidence of pneumonia of a size entirely unlike present-day experience.

Three main explanations have been advanced to account for the different characteristics of the 1918 pandemic. First, it may have been due to a virus of entirely novel antigenic type which, meeting a wartime and susceptible population, behaved as, for instance, measles behaves in a virgin population not previously exposed to it (Fiji, Faröe, and St. Helena epidemics). The suggestion made by Laidlaw and supported by Shope was that the swine influenza virus now prevalent in the pigs of the Middle West of the United States represents the survival in an animal host of the pandemic human virus (Shope, 1943). Evidence for this is simply that swine influenza first occurred in the United States in 1918, and Koen suggested at that time that it was acquired from human cases. The occurrence of antibodies to swine virus in the sera of adult humans but not of children was at one time thought to favour this view, but it is now known that such antibodies develop in response to infection by human virus A influenza. Secondly, pandemic influenza may have been due to a peculiarly high rate of secon-

dary bacterial invasion. Evidence both for and against this can be assembled, but perhaps the weight of argument is against this theory, because no one type of bacterial species occurred more frequently than any other. The third view is that the virus of 1918 influenza was of the same antigenic character as, for instance, virus A, but possessed unique biological properties (Burnet and Clark, 1942). Andrewes (1942) conceived of pandemic virus as being merely a more advanced grade from the virus of present experience with the added property of attacking the lung, but felt that antigenic mutation would alone explain the lethal effect of the viruses on the young adult. Burnet and Clark explain the latter phenomenon on the basis of excessive reaction of the inflammatory response to a strain of virus capable of spreading down into the alveoli.

Comparison of the properties of the various influenza A viruses encountered in the epidemics of different years certainly supports the view that virus strains of almost the same antigenic constitution can vary considerably in their virulence for experimental animals. It is a striking fact that whenever a considerable epidemic is under way no one seems to find it difficult to establish strains of virus A in the ferret, the clinical responses in the ferret are clear-cut, and passage is successful in a high proportion of instances. The viruses obtained from localized outbreaks of years such as 1939 and 1941 were by contrast difficult to transmit to ferrets, caused poor clinical reactions, and tended to die out on passage unless "nursed" along. We also know something of the variations which can be induced in the virus by simple transfer from one animal to another, so that the virus appears to be biologically plastic and capable of very considerable modification. The studies of Burnet and Bull (1943) on the changes which occur in the influenza virus immediately after isolation from human cases indicate the relative instability of the human virus and the considerable ease with which mutation can be induced. Should a strain of virus arise in nature, as a result, perhaps, of a particular combination of circumstances, which possessed both heightened power of spread and changed antigenicity, then a pandemic with particular mortality in the younger age groups might result. When all is said, however, our theories must remain unproved in the absence of opportunity of putting them to the test, and everyone must agree that ignorance is a more blessed state than knowledge born only of bitter experience of a new pandemic.

To summarize: I have tried to show how the knowledge of the virus agents active in the causation of influenza has begun to illuminate the problem of one of man's most implacable enemies. Whenever the influenza epidemics of recent years in Great Britain have been intense and widely spread they have been associated with that virus designated influenza A. Intervening epidemics have been associated both with virus A and with virus B, but a varying proportion of cases clinically similar to those associated with these viruses have remained of unknown aetiology. The clinical features of infection by the two known groups of influenza viruses have been described, and an attempt has been made to interpret the role of the virus in the pathogenesis of the human disease. The manner in which knowledge of the influenza viruses may help us to interpret pandemic influenza of the type experienced in 1918 has been briefly described, and emphasis has been placed on the variable biological properties of the different virus strains and on their power of rapid modification.

(A full list of references will be given at the end of Lecture II.)

We have received from the librarian of the U.S. Office of War Information, American Embassy (1, Grosvenor Square, W.) the printed report of a discussion on "Putting the Disabled Veteran back to Work." Those who took part included Dr. C. D. Selby, medical consultant, General Motors Corporation, and Dr. Harley L. Krieger, medical director, Ford Motor Company. The debate was held in the Mellon Institute on the occasion of the eighth annual meeting of the Industrial Hygiene Foundation, and the report is published by that body from 4400, Fifth Avenue, Pittsburgh, Pennsylvania. It forms Bulletin No. 2 of the Foundation's special series of publications.

DRYING PENICILLIN BY SUBLIMATION IN THE UNITED STATES AND CANADA

BY

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Desiccation from the frozen state has now become well known as the result of its very wide and extensive application to the drying of blood plasma. The art itself is old, and dates back to Shackell in 1909. The subsequent history of the development of desiccation from the frozen state during the present century has been recorded in previous publications (Flosdorf and Mudd, 1935; Strumia *et al.*, 1941; Flosdorf *et al.*, 1945), and these include also reference to the work of Shackell (1909), Harris and Shackell (1911), Hammer (1911), Rogers (1914), Swift (1921), Sawyer *et al.* (1929), Elser *et al.* (1935), Reichel, Masucci, McAlpine, and Boyer (unpublished; see Flosdorf and Mudd, 1935), Reichel (1939), Greaves and Adair (1939), and Greaves (1942, 1944).

By 1935, as a result of the development made by these various workers and of our own contributions (Flosdorf and Mudd, 1935), desiccation from the frozen state was available for general production of various biological products. Hence when the war came the art had been developed and was ready for use with blood plasma; of course, under the stimulation of a project like this, the process was soon applied on a grander scale than ever before.

Earlier efforts to evaluate the possible clinical usefulness of penicillin were abandoned because its liability seemed to make it unsuited as a therapeutic agent (Clutterbuck *et al.*, 1932). However, when later research had resulted in demonstration of the effectiveness of penicillin (Chain *et al.*, 1940; Abraham *et al.*, 1941), it was natural that desiccation from the frozen state should be called upon to stabilize it; meanwhile, drying this way had undergone the necessary development. In many respects the problems with plasma and penicillin were similar and parts of equipment even identical. On the other hand, certain peculiarities in the nature of penicillin introduced problems quite different from any encountered earlier.

Actually, solutions of penicillin are not so labile that they cannot be evaporated at about room temperature without loss in potency, but they foam badly. Desiccation from the frozen state avoided this problem. This also allowed a more highly soluble product to be obtained.

On the other hand, if penicillin is to be dried while frozen it is necessary to hold the temperature lower even than that which is required for many other biological products, including blood plasma. This is not because of the biological lability but because of physical characteristics. Penicillin does not remain in a completely unsoftened condition unless the temperature is below about −20° C., and preferably below −25° C. The exact temperature varies somewhat with the degree of purification and with the concentration of the product; nevertheless, even the least exacting of preparations require a lower temperature than plasma. If penicillin is not kept at such low temperature, because of softening there is bubbling and frothing to a partial extent, and this is sufficient to introduce problems of practical control which are difficult to overcome. Consequently, it is simpler to maintain a lower temperature.

Drying in Bulk or in Ampoules and Bottles

Drying of a biological product intended for parenteral injection may be carried out either in bulk or in the final container in which the product is to be stored and distributed. However, drying in bulk has not met with general favour because of the obvious problems of maintenance of sterility in subdividing dry powder into ampoules for distribution. The problem is made more difficult because of the hygroscopic nature of dry penicillin, the size of doses requiring accurate weighing of small quantities. In spite of this, attempts were made to dry penicillin in bulk for transfer of dried powder to final ampoules, and these represent the first time this has ever been tried in routine large *production* of a biological product. To-day, however, the trend has returned to one of drying in

the final container as proposed in 1935 (Flosdorf and Mudd, 1935). In some cases preconcentration in bulk by partial drying from the frozen state is used with transfer of concentrated liquid to ampoules for final drying. This reduces the size of the final ampoule required, particularly where the original penicillin solution is very dilute. Concentrating in bulk in this way does not offer the same problems of sterility as are encountered by complete drying in bulk, inasmuch as a representative sample of the concentrated liquid is readily enough obtained for bacteriological culturing. If it is found sterile, then there is reasonable assurance that the entire batch is sterile, in contrast with the ineffectiveness of proper bacteriological sampling of dry powders. Improvements in the process of extraction now permit production of concentrated solutions without evaporative concentration.

If final containers such as ampoules or bottles are used for drying, close attention must be given to the necks selected, so that they are adequate in size for the escape of the vapours. These conditions have been fully described (Flosdorf and Mudd, 1935).

Freezing Conditions

There are no particular limitations with regard to the temperatures for freezing other than that they be low enough to ensure complete solidification and fast enough to avoid partial separation of concentrated penicillin. As indicated above, temperatures of −20° and −25° C. represent the maximum which can be used if an unsoftened product is to be dried.

There is a further complication involved in large-scale production of penicillin in contrast with plasma. Because of the larger bulk of material in a single bottle in the case of plasma, the contents will not thaw quite so quickly when removed from the freezing-bath. With penicillin the amounts are so small in the individual containers that this is not the case. Unless special precautions are taken there is considerable hazard of partial thawing after removal from the freezing-bath or from the frozen storage vaults. This is during the loading of the drying chambers and during evacuation to pressures that enable the frozen state to be maintained by evaporative cooling. For that reason, drying chambers of the type used widely for blood plasma (Flosdorf *et al.*, 1945) have been modified to the extent that they can be chilled to sub-freezing temperatures. The product, after being loaded into the chambers, is held in a frozen condition in this way until the proper degree of vacuum is obtained. Then the chilling medium is removed from the jackets of the chambers and the heating medium circulated at proper temperature.

A still simpler procedure has now been introduced which greatly reduces the labour of handling the bottles. The bottles containing the penicillin as liquid are introduced into the chilled drying chambers. As soon as the penicillin has been frozen, which may be within as little as half an hour, the chamber is evacuated and then heated in the usual fashion.

Vacuum Conditions for Drying

It is necessary to set up conditions of vacuum whereby most of the air is removed from the system; otherwise the drying would take an impossibly long time. Under these conditions the ice in the product evaporates directly to the vapour phase.

The water vapour which evaporates from the frozen product may be removed by a number of means, but, in large production, only two basically different methods are being used. Either the water vapour is pumped directly by means of large steam ejector pumps (Flosdorf *et al.*, 1945; Flosdorf and Stokes, 1941) or, alternatively, large refrigerated condensers are used in combination with mechanical vacuum pumps. In the latter case the condenser removes the water vapour and the mechanical pumps serve principally to keep the air out of the system. Chemical desiccants or adsorbents may also be used in place of the refrigerated condensers, but these have not been employed on a production scale for penicillin except in certain combinations with other equipment which will be discussed below.

In any event it is necessary by means of the direct pumping system or the refrigerated condenser to set up a partial pressure of water vapour below that of the penicillin at the temperature at which it is being dried. For temperatures of −20° to −25° C. this means a vapour pressure of the order of 500 to 750 μ. Consequently, the steam ejector or condenser must produce pressures below this, and, on the surface of things, one might expect that the lower the temperature produced by the condenser or the higher the degree of vacuum produced by the steam ejector the more rapidly drying would proceed. However, this is not the case. As drying proceeds the receding surface of the layer of ice within the penicillin becomes covered with a porous outer layer of dried material, which means that the vapours must escape through orifices. According to the laws of adiabatic gaseous flow through orifices—the Napier equation—a pressure of water vapour produced by the condenser or by the steam ejector which is 55% of the vapour pressure of the penicillin will result in as rapid drying as can be obtained (Flosdorf *et al.*, 1945). This we have confirmed by experiment, and it means in effect that a degree of vacuum of the order of 250 to 400 μ is adequate. This applies only to the first stage of drying from the frozen state, which is in reality a process of sublimation of the ice contained in the product. Nevertheless, this does cover the removal of most of the moisture.

However, after all of the ice has been removed from the penicillin we have the second stage of drying, which is one of removing the final traces of moisture from the dry product. The hygroscopicity or the vapour pressure of the dry penicillin varies widely with the preparation in question and depends, among other things, on the degree of purification and concentration. This vapour pressure of the final dry product determines the final degree of vacuum which is required; generally it has been found that from 50 to 100 μ is sufficient.

One procedure which has met with some favour is to use steam ejectors or refrigerated condensers in the first stage of drying for removal of the bulk of the water vapour from the frozen penicillin solution. This affords the most economical way of carrying out the process, since a vacuum of no better than 250 μ is required. To complete the drying, a chemical desiccant is used. By choice of the proper one, partial pressures of water vapour as low as a fraction of a micron are readily obtainable, and make it possible to reduce the final content of moisture in penicillin to as low a level as needed (Flosdorf *et al.*, 1945). Inasmuch as the amount of actual water to be taken up by the desiccant in this second stage is small, weights of desiccant which are reasonable will last for a long time before replacement or regeneration is necessary.

As an aid in reduction to proper final content of moisture the temperature of the penicillin may be raised towards the end of drying to increase the vapour pressure. This in turn raises the pressure which it is possible to use for obtaining final dryness. Although originally it had not been considered safe to take the final dry penicillin to above 40° C., there seems now to be evidence that the final product may be taken to considerably higher temperatures—even as high as 110° C. This, of course, simplifies the problem of obtaining low final moisture.

Final Degree of Moisture and Stability

Although exhaustive data are not yet available which relate the stability of penicillin at various temperatures to the actual content of moisture in the dry product (among other things, it varies with the degree of purification), it is generally agreed that the lower the content of moisture the greater the stability. There is considerable difference of opinion as to just what is the critical level, in some quarters this being placed as high as 7%. In the United States it is required by regulation that the product be reduced to below 2.5%, and there is some evidence that a final content of moisture of 0.5% is necessary for *maximal* stability.

Sealing of the Final Container

Obviously, if it is important to bring the content of moisture in the penicillin to a low point in the first place, it should be maintained low. A glass-sealed ampoule is always of first choice for a hermetically sealed container, but it does offer some difficulty in the clinical use of the material. For this reason bottles sealed with rubber stoppers have met with favour. When rubber-sealed bottles are used, however, it is necessary to relate the length of time the penicillin remains fully potent to the effectiveness of means of protection of the rubber stopper. Rubber and synthetic products are permeable

to moisture. In the case of products like plasma this is not significant, but with others which have a low content of solids it is highly important to give consideration to the amount of moisture going through the stopper.

For example, compare a 10-ml. amount of serum with a 300-ml. amount of plasma. If, under certain conditions of long storage, the 10 ml. of serum will be taken up to 8% moisture content, the 300-ml. amount of plasma will have its moisture content increased only by one-thirtieth of this—by about 0.27%. The reason is that there are 30 times as much solid matter by weight in the plasma container as in the small serum container, yet the amount of moisture permeating the stopper is the same. With penicillin, where the amount of solids may be only one-fifth as great as even in the 10-ml. quantity of serum, the moisture content could go as high as 40% (Flosdorf *et al.*, 1945).

Other Methods of Drying

As indicated above, the stability of penicillin is such that it may be evaporated as a liquid at room temperature without undue loss of potency. Recently, preconcentrating dilute penicillin solution in bulk by means of dielectric heating in low-vacuum apparatus has been carried out successfully. This reduces appreciably the load on the equipment for final desiccation from the frozen state, particularly if the original penicillin solutions are quite dilute. After preconcentrating in bulk in this fashion, the liquid product is distributed to phials in which the concentrated penicillin is frozen and then dried by sublimation.

It may be that before long it will be possible to dry the concentrated solutions of penicillin as a second step by means of dielectric heating on a practicable basis in the final ampoules. The reduction to a final moisture content of 0.5% must be accomplished as a third step in which a warm bath is used to heat, since the dielectric means become ineffective on the dry penicillin. The final product is less attractive in appearance. Solubility is slower, but fast enough for the purpose. The matter will then resolve itself simply into one of economy in handling a large number of ampoules in the second and third steps required with dielectric heating as compared with drying by sublimation.

Summary

Problems met in drying penicillin in contrast with those with blood plasma and other products are discussed. Procedures used in large production are described. Final moisture requirements and types of containers suitable for penicillin are discussed. Use of dielectric heating of penicillin is considered.

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The Research Board for the Correlation of Medical Science and Physical Education, which was formed in 1943 under the chairmanship of Brig. F. Howitt, has issued a first interim report. The material is arranged in four chapters, on maternity and child welfare, education and recreation, the Services (the normal recruit, the sub-standard recruit, and the sick, injured, and disabled), and a note on the work of the Industry Subcommittee by Brig. F. A. E. Crew. There is a foreword by the chairman, and the report concludes with some recommendations. Copies may be obtained from the Ling Physical Education Association, Hamilton House, Bidborough Street, W.C.1, price 2s. (postage 3d.).

GAS GANGRENE AFTER SECONDARY SUTURE OF SHELL WOUND OF THIGH

BY

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I am led to report this case for two reasons: (1) the fact that the gas gangrene followed secondary suture of the shell wound of the thigh; and (2) the fact that the patient recovered after apparently being moribund.

The former occurrence was most disconcerting, as the patient was very fit before the operation and, clinically, the wound looked healthy and suitable for suture and the swab was sterile. Many cases of gunshot wounds had been submitted to secondary suture, and this was the only one which caused any anxiety—all the others were successful. But it is important to record failures or accidents as well as successes. And, as Sir Ernest Rock Carling, with whom I have been in communication, remarks, "one accident does not vitiate the principle, and secondary suture is extremely important." It emphasizes the necessity for taking swabs not only from the surface but from the recesses of the wound. Apparently the organism had been lurking just beneath the surface.

With regard to the latter occurrence, I have never in all my experience seen a patient so ill recover. I asked Prof. F. C. Pybus to see him with me, and we both agreed there was no chance of recovery. It shows that "where there is life there is hope."

Case History

On June 23, 1944, Capt. X., aged 30, and the crews of two tanks were resting beside their vehicles when a German shell burst near them, wounding seven men, including the captain. Assisted by another officer, he dragged the wounded men into slit-trenches, which were dug in the well-cultivated orchard of a French peasant. Capt. X. forgot to apply his field dressing to his wound, which became contaminated with soil. An hour after the bursting of the shell he was admitted to the regimental aid post with a lacerated wound of the skin and muscles of the right thigh, on its anterior aspect, the wound being about 4½ in. long by 2 in. wide. At No. 3 Casualty Clearing Station later that day the wound was found to be widely open but not suitable for surgical treatment, so it was dressed with sulphanilamide powder and vaselined gauze, and a back splint was applied. Two days later, in hospital, the splint was removed, as it was causing pain, and the wound was re-dressed. The patient's general condition was very good. Between the 23rd and 29th he received 3 c.cm. of A.T.S. and 20 g. of sulphanilamide.

On the 29th he was admitted to the Royal Victoria Infirmary, Newcastle-upon-Tyne, under my care. His general condition was still good. The wound of the thigh was rather dirty and pouting, and of a greenish colour. A swab was taken from the wound, and this produced cultures of mixed penicillin-sensitive organisms. Two days later another swab showed streptococci suitable for penicillin treatment. The patient complained of pain on micturition and frequency but no discharge.

On July 6 the wound was cleaner, and not everted so much. There was a very scanty colourless exudate. Dressing was done with penicillin powder and tulle gras, and the wound became cleaner and healthy-looking. A swab showed it to be sterile, so it was decided to carry out secondary suture. This was done on July 14, the edges being undermined and the skin approximated with silkworm-gut sutures. Proflavine and sulphanilamide powder were dusted into the wound. Next day there was a slight amount of serum oozing from the lower part of the wound.

On the 16th there was slight tenderness round the wound; some blood-clot was oozing, and this reappeared when cleared away. His pulse was 120, his temperature normal, and he was fairly comfortable. Some sutures were removed. By the next day a large amount of clot was escaping from the wound. The remaining sutures were removed and masses of foul-smelling clot evacuated. There was oedema over the knee and thigh, and the leg was very tender. His pulse was 108 and temperature 99° F. He was in pain and looked ill. A few bubbles of gas escaped from the wound. An intramuscular penicillin drip was set up in the left thigh. Sulphathiazole was given, together with 12,000 units of anti-*Cl.-welchii* serum, intravenously. That evening 22,500 units of polyvalent serum were administered. A blood drip was started at 09.30 hours, but by 10.30 hours a severe reaction to the A.G.G.S. took place, characterized by respiratory distress, vomiting, and urticaria. The blood drip was stopped as a precaution. The patient was gravely ill the whole day. A swab showed the presence of clostridia other than *welchii*, with sensitive *Staph. albus* and resistant faecal streptococci.

The next day (the 18th) he was still very gravely ill, his temperature being down to 95° F. and his pulse up to 150, thready and scarcely palpable. He vomited altered blood, the vomiting being effortless. A duodenal tube was passed and was left *in situ*. The output of urine fell almost to zero, and he was pale, grey, and sweating, and looked like dying. The oedema had spread up from the thigh on to the abdomen, back, and lower part of chest. In the evening, as a last resort, multiple incisions were made in the thigh, back, and abdominal and chest walls. Considerable quantities of serum and a little gas escaped. A saline-sulphathiazole drip was started—3/4 pint in four hours. On the 20th he was still ill, but his pulse had fallen from 140 to 108 and its volume was better. His temperature had risen from 95° to 98° F. and the amount of urine excreted had increased. In addition to getting whole blood he was having intravenous saline and dextrose most of the time. A swab taken on the 22nd was sterile and the patient continued to improve, his chest being clear and free from pulmonary oedema. The next day he developed a mild phlebitis of the left leg. The drip was discontinued.

During the following week he received two pints of fresh blood and polyvalent A.G.G.S. The penicillin drip was continued. On the 27th his haemoglobin content was 59%. All this time there was a copious serous discharge from the wounds, and precautions were taken to give plenty of fluids by mouth or intravenously. The serum protein was investigated, and showed total protein 5.40%—albumin 3.12%, globulin 2.28% (by difference). An area of redness and swelling developed on the inner side of the right thigh, so on July 30 more multiple incisions were made, but only blood and serum exuded. This process was repeated a few days later. The swelling of the thigh and leg gradually subsided. On the 31st his haemoglobin had fallen to 52%, so more fresh blood was given, and it rose to 58% by the next day. A swab showed scanty *Staph. aureus*, enterococci, coliforms, and Gram-positive bacilli. A swab taken three days later revealed Gram-positive cocci, scanty Gram-positive bacilli—probably anthracoids—and some resistant staphylococci and enterococci.

By Aug. 6 his haemoglobin was 65% and he continued to improve. The serous discharge from the wounds diminished—in fact, most of the wounds were now healed; but there was a discharge of pus containing bubbles of gas from a few of the wounds above and below the original shell wound and the thigh was distinctly resonant on percussion in these situations. It was decided to operate again, and on Aug. 25 the wounds were opened up and from each site, above and below the original wound, a large grey-black spongy slough was removed. The pathological report on these specimens was: "The material consists of two masses of soft friable tissue 5 × 2.5 × 1 cm. and 9 × 5 × 1.5 cm. The material is necrotic, and muscle is not recognized. Microscopically this is completely necrotic. Adipose tissue is the only recognizable one in the section." The patient improved rapidly after this; the wounds (operation and shell) healed completely and he was allowed up. He was discharged to his home on Sept. 28. All the movements of the limb were complete, but there was, of course, wasting of the muscles and he walked with a limp. His general condition was good.

During the course of his illness more than three dozen incisions were made in the thigh, back, abdomen, and chest. He had been given nine pints (900,000 units) of penicillin solution intramuscularly and about 150,000 units of anti-gas-gangrene serum as well as a second full course of sulphonamides. In addition he had large quantities of blood, plasma, saline, and dextrose intravenously.

I acknowledge my indebtedness to the resident medical officer of the Royal Victoria Infirmary, Dr. J. H. Craig, who was responsible for the intravenous therapy and whose interest in the case contributed largely to the happy ending.

The latest report of Dr. H. P. Newsholme as medical officer of health for the City of Birmingham shows that the year 1943 gave cause for satisfaction in a number of aspects of the public health. New records were reached in an unusually large number of directions. The year saw the lowest infant death rate ever recorded in the city; and, with this, the lowest illegitimate infant mortality, falling actually below the particularly low general infant mortality. The city recorded its lowest neonatal death rate for infants under 1 month of age, and its lowest stillbirth rate. The year showed also the lowest notification rate of non-pulmonary tuberculosis so far recorded in Birmingham; last, but not least, the lowest maternal death rate ever recorded in the city was reached in 1943. Against these pleasant facts Dr. Newsholme notes that, largely as a result of a widespread epidemic of influenza, the death rate did not drop quite to the low level of 1942; that there was a 35% increase in the number of new cases of syphilis coming up for clinic treatment; and that there was some increase, though not a large one, in new cases of tuberculosis of the lungs in 1943. No substantial change occurred during the year in the housing position, and the problem of overcrowding as well as that of families housed in dilapidated property remains very serious.

TWO CASES OF TETANUS

BY

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The first of these cases of tetanus is described because it is an interesting example of severe local tetanus developing during the course of a mild generalized attack; and the second—a straightforward example of severe tetanus—because it illustrates certain special points in treatment.

Case I

On Aug. 8, 1944, the patient, a boy aged 5½, trod on a rusty nail, injuring the left foot. No special treatment was given, and the wound appeared to heal satisfactorily. On the evening of Aug. 11 he seemed generally out of sorts and complained of abdominal pain, which woke him up every hour throughout the night. In the morning he had difficulty in opening his mouth. He was admitted to Addenbrooke's Hospital on Aug. 12, about 16 hours after the onset, and then showed the characteristic signs of tetanus: trismus, risus sardonicus, stiffness, opisthotonos, and abdominal rigidity. The foot and leg on the injured side were slightly stiffer than on the other. On the ball of the left big toe was an almost healed wound with no sign of sepsis. There were no other wounds.

Treatment and Prognosis.—200,000 units of antitoxin were given at once, mainly by the intravenous route, and during the next few days trismus and rigidity of the trunk increased. On the 13th reflex excitability increased, and on the 14th he had some slight generalized spasms. Synchronously with the development of these general signs, the rigidity of the left leg became steadily more severe, and by the 14th the whole leg, in contrast to the other limbs, was in continuous muscular spasm and so stiff and rigid that to produce even slight movement at the knee- and ankle-joints required the exercise of considerable force. The leg was slightly flexed at the knee, with the foot plantar-flexed and inverted (see Fig.). Very slight reflex spasms

CASE I.—Local tetanus, left leg and foot.

occurred several times daily until the 17th, and tonic rigidity of the trunk and trismus until the 31st. A severe degree of stiffness of the left leg remained throughout the whole illness, and the left foot was still rather stiff on Sept. 9, when the patient was able to walk about. All stiffness, both local and general, had passed off when he was discharged on Sept. 25.

At no stage of the illness were the spasms severe, and 10 gr. of potassium bromide four-hourly and 1½ dr. of paraldehyde per rectum once nightly for the first five days were sufficient to promote sleep.

Case II

On Sept. 17 a boy aged 8 fell off his bicycle, grazing the dorsum of his right foot. This was treated with dettol and bound up, but the wound was not kept very clean. On the evening before admission he felt generally out of sorts and complained of severe backache and difficulty in opening his mouth. These symptoms became rapidly more severe, and he was admitted to hospital on Sept. 27. On admission risus sardonicus and trismus were pronounced, and he could only separate the teeth a quarter of an inch. There was also severe rigidity of the whole trunk with slight opisthotonos. There were a partly healed septic abrasion on the right external malleolus and other scabs on the right heel.

Treatment and Prognosis.—On admission 100,000 units of antitoxin were given intravenously, and the wound was subsequently cleaned and scabs were removed. The signs increased rapidly in severity, and 24 hours after the onset reflex excitability was becoming extremely marked, and, 36 hours after, generalized convulsions were occurring regularly every half-hour, with very severe trismus. Other ominous signs were a rising pulse rate and temperature and inability to take food because of the severity of the trismus. There was also considerable difficulty with micturition.

Both rectal paraldehyde and avertin in basal anaesthetic doses were first tried to control the spasms, but were unsatisfactory because they were not retained. Pentothal, in doses of 0.25 g. intravenously, was then used as a temporary expedient, but was not very successful. Intramuscular paraldehyde in doses of 3 c.cm. was now tried, and as it proved extremely effective it was continued as required for the control of spasms until Oct. 6. For the first few days a dose of 2 or 3 c.cm. was given twice every 24 hours, and later once. To combat the increasing dehydration, an intravenous drip was started on Sept. 28 and was continued for 48 hours, the needle being kept in the vein by a plaster-of-Paris splint to the forearm.

On Sept. 29 the temperature rose to 103°, the pulse to 160, and the respirations to 45. The chest was very bubbly, cyanosis was present, and it was clear that pneumonia would be likely to supervene. Sulphathiazole was therefore given, first by drip and afterwards by mouth, until Oct. 5, to a total of 26 g. The child's condition, which was critical, showed slight improvement on Oct. 2, reflex convulsions became easier to control, and he was able to take fluids by the mouth. His condition then gradually improved, reflex spasms having ceased by Oct. 8 and the tonic rigidity by Oct. 25. He was discharged well on Oct. 30.

Comment

Local tetanus occurs in mild cases most commonly after prophylactic antitoxin has been given. Usually the local signs occur in the injured limb before any generalized symptoms appear. In head wounds, paralysis or spasm of cranial nerves, particularly the 7th and sometimes the 3rd, 6th, and 9th, is another manifestation of local tetanus. It is an important warning that generalized tetanus will almost certainly develop and an indication for giving antitoxin with the utmost dispatch without waiting for trismus or other generalized signs to appear. The work of Abel *et al.* (1938) suggests that local tetanus is caused by toxin absorbed from the wound affecting the motor nerve endings locally before toxin carried round in the blood stream has had time to produce its effect on the motor nerves generally or to involve the synapses in the brain and spinal cord.

In Case I the signs of local tetanus in the wounded limb were very slight when the signs of generalized tetanus were marked, and it was only after antitoxin had been given that the local tetanus developed to an intense degree, persisting throughout the whole illness and even longer than the signs of tetanus in other parts of the body. It is perhaps worth noting that local tetanus of the type described in this case probably occurs without any detectable signs or symptoms of generalized tetanus later. The following is an example of such a case.

An agricultural labourer aged 55 attended the out-patient department complaining of stiffness and rigidity of the left arm from fingers to shoulder. There was very little pain. Over his hand and forearm were numerous small scabs, which appeared to be some weeks old. The condition had come on gradually over a period of about a fortnight and passed off in the same time. There is a strong probability that this was an example of local tetanus in which the absorption of toxin from very slight wounds had been too small in amount to produce any generalized symptoms. The diagnosis in this case could not be confirmed because the scabs had dried up by the time the patient was seen.

Case II is an example of severe tetanus with a period of onset of not more than 36 hours. The whole march of the disease in its early stages suggested a very bad prognosis. The case is described to illustrate the use of three measures which proved particularly helpful in treatment—namely, (1) intramuscular paraldehyde to control reflex convulsions and promote sleep; (2) a plaster-of-Paris bandage to keep the needle of the intravenous drip in the vein during the period when convulsions were frequent and severe; (3) the early administration of sulphathiazole when the possibility of lung infection was threatening. For the first two suggestions I am indebted to my house-physician, Dr. E. Counsell.

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The Therapeutic Research Corporation of Great Britain has elected the following officers for the year 1945: Chairman, Board of Directors, Lord Trent (Boots Pure Drug Co. Ltd.); Deputy Chairman, Dr. F. H. Carr (British Drug Houses Ltd.). Chairman, Research Panel, Mr. F. A. Robinson (Glaxo Laboratories Ltd.); Deputy Chairman, Dr. C. H. Kellaway (Wellcome Foundation Ltd.).

TIBIAL BONE-MARROW TRANSFUSIONS IN INFANTS

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This paper records our experience with transfusions into the marrow cavity of the tibia in small children, using the apparatus described by Janet Gimson (1944). We have employed this method of administering fluids as an alternative to intravenous therapy during the past 9 months, and are now setting out details of 35 consecutive transfusions. The total number of patients was smaller, as more than one transfusion was given to the same child in several instances. Nearly all the patients were suffering from dehydration due to gastro-enteritis.

Notes on Technique

In this series we have used the technique described by Gimson, and it will be sufficient merely to enumerate some points in which we have deviated from her technique.

The legs are most satisfactorily held by firmly bandaging the soles of the feet to a padded splint so that they are about 9 in. apart, the ends of the splint being tied to the sides of the cot. This allows some movement of the legs but prevents the needle from being dislodged, and nursing is made easier because the splint is well away from the napkin area. Full surgical precautions—mask, sterile gown, and gloves—are taken against sepsis, and the skin is cleaned several times with spirit, then covered with sterile gauze until the needle is inserted. The choice of needle is not always easy, because of the difficulty of judging the thickness of the subcutaneous tissues and of the tibia itself. The most common mistake is to use too large, not too small a needle.

The site chosen is on the flat subcutaneous surface of the tibia, at least 1 in. below the level of the tibial tuberosity. Repeated post-mortem examination showed that even in the smallest infants there is a wide marrow cavity extending almost half-way down the tibial shaft, and it is reasonable to avoid the epiphysial region by a wide margin. No local anaesthetic is used for the insertion of the transfusion needle. The trauma inflicted by the needle seems to be very little more than that occasioned by an injection of novocain, and the pain is purely momentary.

The adapter connecting the needle to the giving set is not entirely satisfactory. It would seem to need redesigning, as in its present form the junction with the needle is easily loosened and will sometimes leak in an annoying way. We have used several adapters which we made from cork and rubber tubing and have found them quite satisfactory. A heat-cradle is useful in at least two ways: it keeps the bedclothes from touching the needle and its tubing, and can be used to warm up the leg if the drip runs slowly.

The Transfusion

Saline, glucose-saline, Hartmann's solution, and half-strength serum have been given with good results. The rate of flow is usually fast enough to meet the child's total fluid need, but we have used transfusions more often merely to supplement fluid taken by mouth. The amounts given are shown in the accompanying Table. It was soon found that the drip usually needed slowing to prevent the development of local oedema. The unrestricted rate of flow bears a fairly direct relation to the weight of the child and to the degree of dehydration, the fluid running faster with the heavier child and the greater dehydration, and slowing down automatically as body fluids become replenished. This is in contrast to intravenous transfusion, in which the rate tends to be unpredictable. The cause for this difference seems to be that whereas in intravenous transfusions the rate of flow is determined by the height of the hydrostatic pressure and the size of the lumen of the vein, the ease of absorption of the

transfused fluid through capillary walls plays an important part in determining the speed of a bone-marrow transfusion.

If the needle becomes blocked it can be freed by sucking through it a very small amount of fluid with a 2-ml. syringe.

Summary of Cases

Case No.	Age	Length of Needle (in.)	Time of Running (hours)	Quantity Given (fl. oz.)	Reason for Abandoning Drip	Remarks
1	5/12	3/8	5	15	Death	Child moribund on admission. Drip delivered 10 fl. oz. in 2 hours though slowed
2	6/12	3/8	30	40	,,	Drip started at 30 drops per minute and speeded up
3	8/52	3/8	4	15	Oedema	Needle too big for child
4	8/52	1/4	9		,,	Needle loose after 9 hours; ? reason
5	9/52	1/4	26	30	,,	Oedema after 24 hours. Drip stopped. Oedema subsided in 6 hours; returned 2 hours after restarting
6	5/12	1/4	10	47	,,	Very small baby for age. Drip probably too rapid
7	5/12	1/4	12	60	Needle blocked	Completely satisfactory
8	5/12	1/4	24	16	,,	Ran very slowly all the time and was inclined to stop
9	2/12	3/8	24	30	,,	—
10	5/12	1/4	60	50	Death	Needle cleared 4 times
11	6/12	1/2	36	40	Improvement	—
12	6/12	1/2	60	50	Needle blocked	—
13	6/52	1/4	60	60	Death	—
14	8/52	1/4	—	—	Drip unsuccessful from start. Needle probably not in medullary cavity	
15	8/52	1/4	62	70	Oedema	Case of pyloric stenosis. Child taken to and from operating theatre with drip *in situ*. Developed osteomyelitis of tibia
16	9/52	1/4	36	35	,,	—
17	4/52	1/4	16	20	Needle blocked	Case of pyloric stenosis. Taken to and from operating theatre with drip *in situ*
18	3/52	1/4	72	60	Oedema	Very satisfactory
19	4/52	1/4	72	60	—	,, ,,
20	5/52	1/4	48	40	Oedema	Slight oedema after 12 hours. Drip stopped for 4 hours, then continued satisfactorily
21	5/52	1/4	36	20	,,	Ran slowly all the time
22	8/12	3/8	36	40	Death	Necropsy showed localized infection of needle track but not of bone
23	6/12	3/8	22	18	Oedema	Very restless child. Needle loose after 22 hours
24	6/12	3/8	48	40	,,	—
25	6/12	3/8	18	10	Persistent leaking at adapter	Same baby as Case 23; left leg used for both drips. Second drip started 42 hours after discontinuation of first
26	8/52	1/4	72	40	Oedema	Ran slowly throughout
27	7/52	3/8	—	—	—	Very small baby. Needle too long. Drip did not run
28	7/52	1/4	108	80	Stopped deliberately	Same baby as Case 27
29	2/12	3/8	72	Not recorded	Slowness of drip	Fat child. Needle apparently not at right angles to bone
30	2/12	3/8	72	,,	Oedema	—
31	3/52	1/4	132	,,	Death	—
32	3/12	1/4	30	50	Oedema	Drip given too fast; 15 fl. oz. in first 3 hours. Early oedema caused by rapid rate
33	5/52	1/4	48	50	,,	—
34	9/12	1/4	60	40	,,	Ran slowly throughout
35	8/52	1/4	40	40	Death	Ran well

This may cause less damage than the opposite manœuvre—syringing through into the marrow cavity. Oedema is occasionally troublesome, and seems not to depend only on the tightness of the needle in the bone. It sometimes occurs much higher up the leg than the site of insertion of the needle, the region just above the knee being commonly affected. As previously mentioned, leaking at the junction of needle and adapter is another trouble, and even tight and carefully planned strapping does not eliminate it. Leaking due to the needle working loose occurs less often in the early stages, but is a common reason for discontinuing the transfusion after several days.

There is no doubt that osteomyelitis is to be feared. In the one case in our series of saline transfusions in which it developed the operator had not used gloves. Whether or not this led to the infection cannot be decided, but it is considered likely. In no other case was any harmful effect noted, and the relief of dehydration by the intramedullary route appeared to be fully as effective as by any other method.

Use of Blood

The first time this technique was used 2 fl. oz. of whole blood was run in 8 hours into the tibia of a child 2 weeks old who had acute anaemia. The drip then stopped of its own accord and no attempt was made to restart it. No ill effects followed the transfusion. Two other patients were given blood: one was a child 18 months old who had empyema, the other an infant of 11 days with erythroblastosis foetalis. The first received only 4 fl. oz. of blood in 12 hours, although the pressure was raised by suspending the bottle 7 ft. above the leg (Gimson, 1944; Behr, 1944); the second received a negligible amount. In both cases repeated attempts were made to accelerate the rate of flow; both patients developed osteomyelitis, and surgery was needed.

No further attempts at giving blood by this route were made. It is worthy of note that dilution of the blood did not facilitate transfusion. The use of Officer's mixing chamber (Bailey, 1944) was attempted without success.

Comment

There is no doubt that in practised hands the intramedullary drip is valuable in the treatment of small children needing fluids. It is very quickly set up: the insertion of the needle takes only a few seconds, as compared with the 10 minutes or so needed for tying a needle into the internal saphenous vein. But a certain degree of skill is required, and this is borne out by the fact that nearly all the unsatisfactory transfusions in this series were set up—under our supervision—by house officers who had had little experience of the method.

Nursing needs particular care because of the tendency of the drip to run too fast and to speed up after an initial slowness, and because of the ease with which local oedema can develop. We have not been impressed with the regularity of flow mentioned by Gimson. Restarting immediately after the oedema has subsided is not usually satisfactory. The leg may, however, be used for an intravenous drip provided that no oedema is present. The double method was employed several times very effectively.

If precautions against sepsis are adequate there seems to be little risk of infection. A very small hole is left when the needle is withdrawn, and this heals quickly and completely. Two transfusions were given into the same tibia with an interval of 42 hours, which is considered to be the minimum.

Summary

Details of our experience with intramedullary tibial transfusions are given, with a commentary. The conclusion is reached that the method is a valuable alternative to intravenous therapy, but that it is not suitable for the giving of blood.

We desire to thank the honorary staff of Addenbrooke's Hospital for allowing access to their patients.

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New Zealand vital statistics are often quoted, and for obvious reasons. The report for 1943–4 of the Director-General of Health, Dr. M. H. Watt, records that the death rate in the Dominion in 1943 was 10.04 per 1,000 mean population. The infant mortality was 31.37 per 1,000 live births, and the stillbirth rate was 26.25 per 1,000 live births. The maternal mortality, including death from septic abortion, was 2.21 per 1,000 live births; when deaths from septic abortion were deducted the maternal death rate was 1.71. Notifications of scarlet fever rose steeply from 457 in the previous year to 1,196 in 1943—the highest number since 1931. The relative immunity of the Maori to scarlet fever is shown by the fact that in 1943 only one case of this disease was reported in the Maori population. The outbreak of influenza in the Northern Hemisphere was watched with some anxiety, but did not reach the shores of New Zealand. In order to minimize the risk of importation of mosquitoes not present in the Dominion a Mosquito Control Committee was set up to collect specimens and carry out surveys in Wellington and Auckland and in the neighbourhood of aerodromes and elsewhere, and on its advice steps have been taken to eliminate all potential breeding-grounds for mosquitoes in and about the ports and aerodromes.

Medical Memoranda

A Clinical Sign of Vagotonia

One of the most difficult decisions a physician has to make is in the small hours of the morning at the bedside of an elderly patient who is in or who has just recovered from an attack of orthopnoea. There is little clinical evidence of disease to help; indeed, extensive clinical examination is too distressing to be employed, and one must be content with a rapid and superficial search for abnormality. Frequently in such a case the chest is emphysematous, there are no accessory breath sounds, and expiration is prolonged and the heart sounds are distant. Temporarily the heart muscle is indicted, and the case is labelled one of cardiac dyspnoea, with all its attendant fears, until a more detailed examination is possible.

Some 10 years ago I noticed in many of these cases the following physical sign, which I have found most helpful in making an immediate diagnosis. When present it is, I claim, an unmistakable sign of vagotonia, producing the symptoms of a paroxysm of bronchial asthma in its initial, waxing, or waning stages. It is often the only indicator of the true cause of the breathlessness complained of by middle-aged or elderly patients. Listening close to the patient's mouth, one hears, without the use of the stethoscope, a fine effervescing bubbling sound during expiration, and in marked cases to some extent in early inspiration. The sound resembles that heard at the neck of a full bottle of soda-water from which the cork has recently been withdrawn. So similar are the two sounds that I have come to call it "the soda-water sign" when speaking of it to others. It cannot be heard through the stethoscope, but its audibility can be increased by folding the morning newspaper for use as a megaphone by the patient or as an ear-trumpet by the physician.

The sign can be banished by the subcutaneous injection of an adrenaline salt, and with it will go the dyspnoea. Further, those cases which have not already developed frank bronchial asthma will do so to a greater or less extent before long: it may be a slight bronchial catarrh with dyspnoea, it may be only dyspnoea on exertion, or it may be a characteristic attack. I have seen it so in many cases, but two stand out in my memory. In the first the sign preceded the asthma by two years, and in the second by five years.

The sign is clearly due to the contraction of the bronchial muscles gradually allowing the inspired air to escape through tubes the lumen of which is narrowed by the spasm and by turgescent mucous membrane covered by a liquid exudate. The rales thus formed are at this stage too delicate to transmit vibrations through the chest wall, but they are conducted up the trachea and amplified by it and the buccal cavity. The recognition of the sign clinically will quickly bring a full realization of its value.

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Penicillin in Ophthalmic Therapeutics

The following investigation was carried out in conjunction with Major S. T. Cowan, R.A.M.C., officer in charge of a military laboratory. Its object was to find out what, if any, was the effect on the activity of penicillin of the drugs most commonly employed in clinical ophthalmology.

The drugs tested were: (1) atropine, (2) eserine, (3) adrenaline, (4) cocaine hydrochloride, (5) decicain (amethocaine hydrochloride), (6) argyrol (argent. prot. mite), (7) fluorescein. With the exception of adrenaline, which was used as liq. adrenalin. hydrochlor. 1/1000, the drugs were employed and tested in double the customary strength, so that when diluted with penicillin solution the resultant strength was as desired. Our endeavour was to stimulate as nearly as possible the conditions maintaining in the conjunctival sac.

Procedure.—Penicillin (2 units per ml.) and the drug under test were mixed in equal volumes, and were kept at 37° C. for three hours. The controls were: (1) penicillin (2 units per ml.) + water; (2) each drug + water. After incubation the mixtures were pipetted into porcelain cylinders on plates sown with the Oxford staphylococcus H. The plates were incubated overnight, and the diameter of the zone of inhibition was measured.

Findings.—Argyrol + water diffused into the agar and inhibited the growth of the test organism almost as much as did argyrol + penicillin. Of the other drugs tested none had any inhibitory action on the staphylococcus; only one—adrenaline—inactivated the penicillin in the mixtures.

Additional experiments were made with two solutions of adrenaline hydrochloride. Equal volumes were mixed with penicillin (10 units per ml.) to give a final concentration of 5 units per ml. in the mixture. After incubation at 37° C. for one hour the activity of the penicillin was determined as before. With one solution, said to be several years old, the penicillin in the mixture was reduced to about 0.5 unit per ml. With a more recent sample of adrenaline the penicillin was *completed* inactivated.

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Susceptibility to Acute Nephritis

The following case history may be of some interest as illustrating a familial susceptibility to acute nephritis.

Three girls of the same family, aged 10, 7, and 6 years, were admitted to hospital on Oct. 9, 1944. On attending a child welfare clinic three weeks before admission all three children were found to be infested with *Pediculus capitis*. A nit comb was supplied to the mother, and a week later the children's faces became puffy and swollen. This was more marked in the morning on waking up. It was not until a week later when they attended the child welfare clinic again that their heads were seen to be covered with crusts. Castor-oil and zinc ointment was applied to their heads, and bread poultices to their faces. Three days later the children lost their appetites and their urine was noticed to be red in colour. Of the two younger children, one developed oedema of the legs and back and the other of the legs alone. There was no history of scarlatina or sore throat. The mother gave a history of having had nephritis at the age of 18, and a sister of the father had died of "kidney trouble."

On admission all three showed a considerable degree of impetigo involving the scalp and limbs. There were still many nits present. The two younger children showed oedema of the face, legs, and back. The blood pressure in all three was raised, being 172/120, 152/115, and 160/110. The urine in all three was smoky, loaded with albumin, and contained many epithelial cells, pus cells, and red cells, with a few hyalogranular casts. There was no oliguria, and during their stay in hospital the oedema and blood pressure subsided, and the impetigo rapidly cleared up with dressings of gentian violet. Examination of swabs taken from one of the impetiginous lesions showed *Staphylococcus albus* and a non-haemolytic streptococcus.

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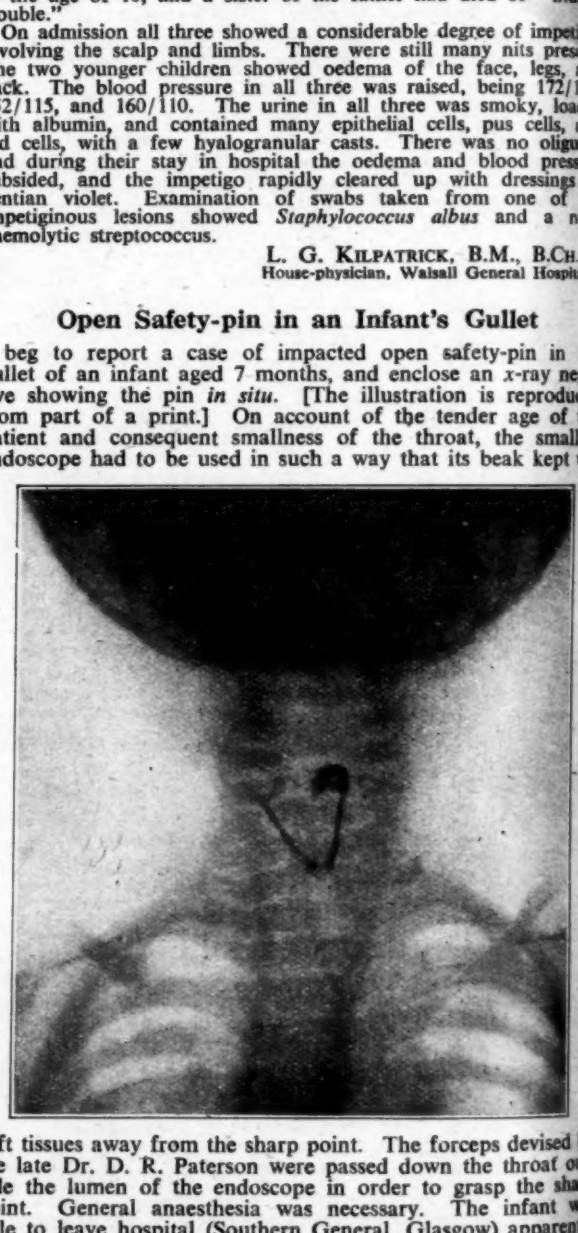
Open Safety-pin in an Infant's Gullet

I beg to report a case of impacted open safety-pin in the gullet of an infant aged 7 months, and enclose an *x*-ray negative showing the pin *in situ*. [The illustration is reproduced from part of a print.] On account of the tender age of the patient and consequent smallness of the throat, the smallest endoscope had to be used in such a way that its beak kept the



soft tissues away from the sharp point. The forceps devised by the late Dr. D. R. Paterson were passed down the throat outside the lumen of the endoscope in order to grasp the sharp point. General anaesthesia was necessary. The infant was able to leave hospital (Southern General, Glasgow) apparently unscathed after a few days' observation to rule out hidden trauma.

Glasgow. D. RITCHIE PATERSON, F.R.C.S.ED., D.L.O.

A Case of Adder Bite

Dr. Batt's communication in the *Journal* for Aug. 5, 1944 (p. 181), prompts us to report a case of adder bite which recently came under our care. About 8 p.m. on the evening of June 29 one of us (E. R. W.) was called urgently to see a rather delicate little girl aged 11 years at a farm about seven miles out in the hills. On arrival it was found that the child, while picking wild strawberries in a railway cutting, had been bitten on the tip of the right forefinger by an adder about an hour previously. She had managed to make her way home, about half a mile uphill. She was very collapsed, was of greyish-white appearance, and vomited incessantly. On the tip of the finger was an indolent-looking wound like a 3- to 4-day-old laceration from barbed-wire injury, surrounded by a blackened area. She made no complaint of pain then or subsequently. A thin rubber band was applied to the base of the affected finger; the wound was incised, but could not be induced to bleed more than a drop or two, and some gelatinous-looking material—presumably the snake toxin—was wiped out. Potassium permanganate was placed in the wound and an injection of nikethamide (coramine) was given. The finger was dressed with a saturated magnesium sulphate solution.

In spite of her shocked condition it was decided to transfer the child to Pembroke County War Memorial Hospital, Haverfordwest, 12 miles away. She was very collapsed during the journey by car, and nikethamide was given. She was admitted to the hospital: notes of her progress are reported below.

It is of interest to record the attempts made to obtain antivenene serum. The station commander of a near-by airfield was telephoned and gave the prompt assurance that he would arrange for any supply of serum to be flown to the hospital without delay. The hunt for antivenene then started. A call was first put through to the London Zoo authorities, who replied that their instructions were to refer all such inquiries to the Ministry of Health. The Ministry was contacted, and they replied that although they held no stock of serum they would communicate with the Zoo. It was explained that the Zoo had already been approached. The Ministry then undertook that if any serum could be found in London it would be rushed to the specified airfield in the morning. This was midnight.

A little later the R.A.F. station commander rang up to say he had been informed that there might be some serum at the Royal Hamadryad Hospital, Cardiff. The latter hospital was rung up, and referred us to the Royal Infirmary, Cardiff, but they had none. The R.A.F. commander again rang up in the small hours of the morning to say he had communicated with a large American hospital in the Midlands and had been referred by them to a vaccine-manufacturing firm in the West Country. Negative results were again obtained. The Ministry of Health, however, was as good as its word, and about midday on the 30th ampoules of antivenene prepared by the Pasteur Institute, Algiers, arrived at the hospital by plane from London.

CASE HISTORY

A girl aged 11 was admitted to the Pembroke County War Memorial Hospital at 9 p.m. on June 29, 1944, with a history of being bitten by an adder on the pulp of the index finger of the right hand.

On admission the patient's general condition was poor. She was very shocked and cyanosed. The pulse was imperceptible and she vomited copiously a bile-stained fluid. A black discoloured wound was present in the pulp of the index finger. She was treated for shock. Half an ampoule of nikethamide was given 2-hourly for three doses and rectal salines 4-hourly. There was no swelling of hand or arm on admission. At 12 midnight the back of the right hand started to swell, vomiting ceased, and pulse quality and rate improved.

On the morning of June 30 the right hand was very swollen and slightly discoloured. There was no swelling of the arm. At 9.30 a.m. the finger tourniquet was removed and this was immediately followed by much swelling and lymphangitis of the whole arm, extending to the axilla. Hypertonic saline compresses were applied 2-hourly, with saturated magnesium sulphate compresses to the wound. Rectal salines were continued, with fluid freely by mouth. At 2.30 p.m. 5 c.cm. of serum was given intramuscularly. This was repeated at 5.30 p.m., and there was immediate improvement, general and local.

July 1: General condition improved. Hand and arm still swollen, with marked lymphangitis of arm and much greenish-yellow discoloration on the inside of arm. Large purple bullae around nail of affected finger. Nail snipped, with liberation of much dark-brown serous fluid. July 2: Swelling decreasing; lymphangitis subsiding; discoloration of arm still marked. July 3: Slight further improvement; finger-tip and nail very discoloured. July 4: Improvement; discoloration of finger and arm continues. July 6: Yellowish discoloration of forearm very marked; fair amount of purulent discharge from finger. July 7: Urticarial rash appeared, of a generalized distribution. Improvement continued, and patient was discharged on July 26.

COMMENTARY

In our belief the condition of the child was critical and dangerous for 24 hours immediately after the bite. The local and general condition improved markedly after injection of antivenene. Points to be noted are: the great difficulty of obtaining serum and the apparent lack of available supplies; and the not infrequent occurrence of adder bite: several cases have come to the care of one of us (E. R. W.). We suggest that antivenene should be available to practitioners of every rural county, through the M.O.H. or local hospital.

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Gold Nephritis and Dermatitis in Pulmonary Tuberculosis

Gold is used mainly in the treatment of rheumatoid arthritis and pulmonary tuberculosis. Toxic reactions are not very common, but among them skin rashes are greatly feared owing to the long time they take to clear up. Nephritis with oedema is a rare complication which usually takes some time to resolve. Douthwaite (1944) recently said that he has seen one case which recovered after three months. The following case is of interest as the woman developed nephritis and dermatitis at the same time, both of which had cleared completely in five weeks.

CASE HISTORY

Mrs. X., aged 26, has bilateral pulmonary tuberculosis. General condition good. Weight steady; temperature range 98–99°; pulse 82–96. Physical examination showed diminished respiratory movement in the right upper zone, with increased tactile fremitus, dullness on percussion, bronchial breathing, and fine rales anteriorly. Posteriorly there were fine rales in the right suprascapular region and on the left side at the medial end of the scapular spine. Radiographs showed: (R.) Medium shading in upper zone with a cavity 1 in. in diameter; (L.) a small area of fine shading in the first interspace. The patient's sputum contained acid-fast bacilli on direct smear, and the E.S.R. (Westergren) was 26. She was kept on bed rest, but the temperature did not settle and serial radiographs showed progression of both lesions. It was therefore decided to induce a right artificial pneumothorax, and also to give gold therapy because of the involvement of the left side. Myocrisin intramuscularly was started on May 9, 1944, and given weekly. The dosage was 0.01, 0.02, 0.05, 0.1, and 0.15 g.—a total of 0.33 g. having been given before toxic symptoms arose. The urine was tested for albumin on the day of administration and on the day after. An R.A.P. was successfully induced on May 22, and adhesions requiring section were later found.

Seven weeks after the start of the gold course, and six days after the last injection, a rash appeared. This was a generalized red maculopapular rash, most marked on the legs. The submandibular and inguinal glands were enlarged, and the urine contained no albumin. On the third day the rash was confluent and pruritus marked; stomatitis was present and there was puffiness of the eyelids and face. The temperature had also started to rise, reaching its maximum on the ninth day of illness with an evening reading of 101.4° F.

On the fourth day there were generalized pitting oedema and oliguria. Weight was increased 6 lb.; B.P. 130/80. The urine contained a trace of albumin. The diet was restricted to one pint of glucose orangeade a day, and an intake and output chart was kept. Lotio calaminae was prescribed for the pruritus. Fifth day:—Peeling of face, chest, and limbs started; urine clear and remained so afterwards. Seventh day:—Weight up 9 lb. Eleventh day:—Oedema was still present, with a daily average output of 18 oz. The face was now covered with a weeping eczema, and the rest of the body had the appearance of a typical exfoliative dermatitis. Lotio calaminae oleosa *B.P.C.* was applied to the face, and the rest of the body was covered with a paste made of

R	Pulv. zinci	..	dr. 2
	Pulv. amyli	..	dr. 2
	Paraffin. molle	..	oz. 1
	Ol. ric. ..	..	q.s.

Fifteenth day:—Dermatitis on legs started to improve. Vasomotor paralysis present in legs—blanched on raising and becoming purple on hanging down. Sixteenth day:—Temperature started dropping by lysis. Diuresis began with an output of 41 oz.

On the twenty-eighth day only the face was affected with a scaly eczema. Paste was applied. The weight returned to normal and the diet was increased; the temperature was normal. By the thirty-fifth day the face had cleared.

This patient therefore had a gold nephritis, which cleared in three weeks, and simultaneously a dermatitis, of which there was no sign whatsoever after five weeks.

I wish to thank Dr. Dennison Pickering, medical superintendent, Pendyffryn Hall Sanatorium, for permission to publish these notes.

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Reviews

STUDY OF CANCER IN ARGENTINA

Memoria del Instituto de Medicina Experimental para el Estudio y Tratamiento del Cancer, 1940-43. By Prof. A. H. Roffo. Buenos Aires. 1943.

There could be no stronger evidence of the noteworthy contribution of Latin America to the progress of medicine than this comprehensive report of the Institute for the Study and Treatment of Cancer. The Institute began its work at Buenos Aires in 1922 on a small scale, and has increased steadily in size and influence until it is now one of the largest and best-equipped institutions of its kind in the world. Since its commencement 120,000 patients have come under supervision, representing more than a million and a half consultations and treatments. Within the scope of the Institute are included not only the care and treatment of patients at dispensaries for early diagnosis, out-patient clinics, and hospitals, but also the training of nurses, the spreading of information to the general public and to the medical profession, and the experimental investigation on a large scale of all aspects of the cancer problem.

The report now issued, a large volume of 700 pages, includes a mass of statistical data in tabular form. Taken alone such tables are apt to prove dull reading, and they have therefore been supplemented by anatomical and other diagrams which show at a glance the incidence of the various forms of cancer and the results of treatment. Much has been achieved by early diagnosis, and it is a striking comment on the value of the work to note that in 1924 81% of the patients did not apply for treatment until the disease had been present for six months or more, whereas in 1943 70% came under observation during the first three months of illness, and 48% in the first month. Naturally enough, cancers of the skin, the larynx, and the breast were seen at an earlier date than, for example, cancer of the uterus, which is so apt to escape recognition.

Eight thousand persons attended the dispensaries for early diagnosis and treatment in 1943. In the provision of hospital accommodation it has been found that cancer patients can be more effectively treated in small rooms containing only a few beds than in a large ward, in which the surroundings are apt to be disturbing to a mental outlook already greatly upset. In the new pavilions of the Institute each room accommodates only one or two patients. Statistics show that town and country each contributes an equal number of patients, and that there is a similar equality between the two sexes, and also between Argentines and foreigners. A series of maps illustrate the locations in the Republic from which the patients are derived.

A study of the site of cancer in a large series of cases reveals some interesting facts. The skin is the tissue most frequently involved, and this frequency appears to be increasing—from 10% of total cases in 1926 to 24% in 1943. The great majority of skin cancers affect the neighbourhood of the face, especially the lips and nose. Another region in which cancer is met with in mounting frequency is the lungs. There were 98 cases in 1942—3% of the total. The increase of motor traffic and of the use of oil as fuel may partly account for this rise in incidence. Next in frequency to skin cancer are cancers of the uterus (15%) and the breast (12%). Tongue, oesophagus, and stomach each contributed 4%, rectum and larynx 3% each.

Another section of the report deals with the information derived from histological investigations. There were 7,000 biopsies in four years. Carcinomas (5,000) far outnumbered other forms of tumour, which included 1,500 benign tumours and 200 sarcomata. The remarkable effect of deep *x*-ray therapy upon some of those cases of sarcoma is illustrated by a series of photographs; and the equally striking results of what is termed "proximoroentgenterapia" in skin cancer are also illustrated. A full account is given of the *x*-ray and radium treatment of uterine cancer, including the technique and dosage. Modern apparatus is described, and there is a brief account of the physical basis of radiotherapy. Next comes a description of deep *x*-ray therapy and of its effect upon normal and diseased tissues. While this remains the method of choice in the majority of cases, many cancers of the skin were treated by radium and radon. Surgical treatment was adopted in only 10% of the total cases, the organs most frequently involved being the stomach, the breast, and the larynx. The diathermy knife or needle was the instrument preferred. The efficiency of the "follow-up" method which has been adopted is shown by the completeness of the statistical information which concerns the results of treatment.

One of the most interesting sections of the report consists of a series of 97 abstracts of papers on various aspects of the cancer problem which had already been published in the Bulletin of the Institute. To those pages—502 to 553—many experts may turn with profit. No less important is the synopsis of lectures and demonstrations given during the period under review, not only to students and practitioners but also to nurses, for whom special training in "cancerologia" is provided. The volume concludes with copies of the clear and concise directions which are issued to patients, to visitors, and to nurses, and with an account of the antitobacco campaign which the Institute has promoted among Argentine students.

The report is richly illustrated with excellent photographs of the Institute and its equipment. It is a publication which reflects great credit upon Dr. Angel H. Roffo, Professor of Cancerology and Director of the Institute.

DOUGLAS GUTHRIE.

GENERAL MEDICINE IN 1944

The 1944 Year Book of General Medicine. Edited by George F. Dick, M.D., J. Burns Amberson, M.D., George R. Minot, M.D., William B. Castle, M.D., William D. Stroud, M.D., and George Eusterman, M.D. Pp. 768; illustrated. 18s. 6d.) Chicago: Year Book Publishers; London: H. K. Lewis and Co.

The Year Book of General Medicine for 1944 continues its useful systematic record of steady progress, though there is nothing startlingly novel to report. It is noteworthy that even in America there are signs of a revolt against excessive dependence on laboratory tests. There is an interesting review by Moscheowitz of what he terms the hyperkinetic group of diseases, characterized by exaggerations of normal bodily functions with morbid structural changes as a s quel. Examples are: (i) hypertension of the greater circulation, which represents an exaggeration of normal arterial pressure, leading to arteriosclerosis and its consequences; (ii) Graves's disease, in which there is an exaggeration of the normal basal metabolic rate; (iii) peptic ulcer, in which one of the dominant features is exaggerated gastric secretion of acid; (iv) cardiospasm, spastic colon, and other instances of an exaggeration of normal tonicity and peristalsis; (v) manic-depressive psychosis, representing an exaggeration of a normal rhythm; (vi) paranoia, an exaggeration of the affective functions. These maladies have a common denominator in a maladjustment between the psyche and the environment, and are mostly products of civilization.

Choosing almost at random from the articles which have interested us, we would mention the study of infective hepatitis (p. 35) and the proof that complete structural recovery of the liver cells can occur (p. 675); also the evidence that in anterior poliomyelitis (p. 67) and in pernicious anaemia the nervous lesions are by no means confined to the spinal cord. It has often been supposed that conditions characterized by marked asthenia might be due to a functional inadequacy of the adrenal cortex; this is substantiated by the discovery (p. 740) that such individuals are unable to conserve their chlorides, just as are sufferers from Addison's disease.

HEALTH PROBLEMS FOR EVERYMAN

Battle for Health. A Primer of Social Medicine. By Stephen Taylor, M.D., M.R.C.P. (Pp. 128. 5s.) London: Nicholson and Watson.

Since Dr. Stephen Taylor wrote his brilliant description of "the suburban neurosis" he has been well known as a vigorous exponent of the social aspects of medicine. His latest contribution, *Battle for Health*, forms one of a rather militant series—*The New Democracy*. In it he points the path for the wayfaring man, aided by vivid isotype diagrams which may be a help to the comprehension of some people. The book is well illustrated, though surely the picture of a graveyard is unnecessary. Interesting portraits of medical pioneers are added, though in one instance there must be a mistake: under Sir Charles Sherrington's portrait the date of his birth is given

as 1875, which would mean that he took his Tripos at the age of 6. But such things do not interfere with the general merit of the book, which attains its purpose of informing the ordinary reader of the main facts in the history of the fight against disease, and the factors involved in the maintenance of health. Nor will the medical man fail to find interesting information therein. Knowledge is, in the author's opinion, a necessary key to health for everyone, for "this is not a job for doctors alone. It is a job for all of us. . . . Health is not to be found in the medicine cupboard nor yet in the pages of 'keep fit' magazines; both breed rather hypochondriasis." Rather must we look to scientific analysis of the problem and a logical synthesis of the results. Dr. Taylor is careful to point out that there are aspects of the problem outside the ambit of the doctor: housing, compulsory pasteurizing of milk, no more ribbon development or suburban sprawl, for instance. To pretend that a national health service by itself can remedy such causes of ill-health is a fraud on the public. One cannot but admire the sincerity and generous sympathy of the author.

Notes on Books

The publishers and editors of the *Year Book of the Eye, Ear, Nose and Throat* have continued faithfully to discharge their annual task with obviously no slackening of standards or diminished zeal. A peculiar mixing of the paper is explained as a device to maintain the same bulk with papers which have to conform to certain wartime standards of production. This, however, has been arranged so that the quality of the illustrations is maintained. There has perhaps been a general scarcity of the best class of medical literature in recent years owing to preoccupation with military work, diversion of effort into other spheres, and general lack of leisure for research and literary work. There can, however, be found much worth attention in all the sections of the book, even if some of it seems to be rather repetitive, and the specialists concerned still lie under a deep obligation to the accuracy and discrimination of the editorial control. The 1944 edition is published in this country by H. K. Lewis and Co. at 18s. 6d.

A Textbook of Physiology, by Profs. WILLIAM D. ZOETHOUT and W. W. TUTTLE, is now in its eighth edition (London: Henry Kimpton; 25s.). As we said when noticing an earlier edition, this American work is meant to fill the gap between the larger textbooks and books of an elementary character, and should be useful to students working for the Conjoint or for examinations in pharmacy, domestic science, etc. The first chapter, dealing with protoplasm and its environment, has been almost entirely rewritten, and in other respects there is evidence of careful revision. Much of the advanced chemistry and the more detailed anatomy are now set in smaller type so that the student may pass them over without losing his main thread.

A fifth edition has now appeared of *Notes on Clinical Laboratory Methods*, sponsored by a standing committee set up by the Faculty of Medicine of the University of Glasgow to secure uniformity in the laboratory technique employed in clinical teaching at Glasgow. The field covered is equivalent to side-room testing as usually carried out by students of medicine, with some further tests which they may conduct in the clinical laboratory. The booklet is published by John Smith and Son (Glasgow) Ltd., Gibson Street, Hillhead, Glasgow, at 3s. 6d. There are blank pages at the end for the student's own notes.

The Discovery of the Uses of Colouring Agents in Biological Micro-Technique, by JOHN R. BAKER, D.Sc., is now published as a monograph of the Quekett Microscopical Club, at whose 743rd meeting in London on July 13, 1943, the author read it. Dr. Baker hopes that his essay may be of interest not only to historians of science but also to biologists and biochemists in general, and we think it will. It is concerned with the use of colouring agents in microscopical studies and does not deal with macroscopical reactions except incidentally. The publishers are Williams and Norgate, Ltd., 36, Great Russell Street, W.C.1, and the price is 1s. 6d.

Dr. RAPHAEL E. G. ARMATTOE, now of Londonderry, has written a short account of *The Swiss Contribution to Western Civilization*, published at 5s. (post free 5s. 2d.) by W. Tempest: Dundalgan Press, Dundalk. Dr. Julian Huxley commends the pamphlet in a brief foreword, and recalls that Swiss freedom has been prolific of benefits to the world at large. "It is also encouraging to reflect that Switzerland is the one real centre of science, learning, and culture in Europe which has been able to remain out of the war." D. Armattoe disclaims any pretension to have given a comprehensive survey of Swiss men of science and letters. His criterion for listing men in his work is that they made a definite contribution to knowledge or left the world a happier, a better, or a more beautiful place than they found it.

Lieut.-Col. F. A. BARKER, I.M.S.(ret.), has written a valuable report, *The Modern Prison System of India*, in which he outlines the progress of prison reform in that country during the twenty years following the publication of the report of the 1919–20 Indian Jails Committee. The author has taken a prominent part in Indian penal administration for nearly 30 years and is thus well qualified to appraise the work so far accomplished. The volume is published at 10s. 6d. by Macmillan and Co., under the auspices of the Department of Criminal Science of the Faculty of Law in the University of Cambridge. Lord Hailey contributes a foreword; and Prof. P. H. Winfield, in a preface, remarks that Col. Barker's book not only clearly describes the prison system in India but also gives a vivid account of the many factors that make the problems connected with the system infinitely more complicated than those with which we have to grapple here.

Preparations and Appliances

APPLIANCE FOR A NEW METHOD OF MASSAGE

Dr. W. T. HUNT (Acton, W.3) writes:

By means of an instrument consisting of a series of cuffs, similar to that in a sphygmomanometer, which are repeatedly inflated in rotation to any desired pressure and then simultaneously deflated by means of a motor pump, operating through a controlling mechanism, waves of constriction can be sent up a limb, hastening the return flow in the lymphatics and veins or causing a passive congestion if directed distally.

The cuffs are incorporated into sheaths made for the upper or lower limbs, which can be quickly applied, and the pressure in the cuffs readily controlled by turning one knob; there is a pressure gauge contained in the apparatus, and the motor works from an ordinary lamp socket or wall plug. The instrument is easily transportable in two small hand cases.

Ascending compression is employed with this instrument in the following conditions: Milroy's disease (hereditary oedema of the legs), lymphoedema, callous oedema after fracture or injury or phlebitis, and oedema due to varicose veins, erythrocyanosis, "white leg," cardiac and renal conditions, intermittent claudication, and in treating unsightly oedema from an unknown cause in women. This treatment can also be employed to free a limb of oedema before Kondoleon's operation is performed, being used as near as possible up to the time of operation and afterwards to establish connexions between the skin flaps and underlying muscles.

Descending compression can be employed to tide over an arterial crisis—e.g., embolism—to break up a clot, or to restore circulation, and also for Buerger's and Raynaud's diseases, chilblains, frost-bite, and crush syndrome.

If the instrument is used for causing an ascending wave of compression the venous and lymphatic circulation will be increased in proportion to the pressure used; this will lead to an opening up of the collateral venous and lymphatic systems and help the re-canalization of blocked veins. If used in the opposite manner the arterial circulation will be increased, causing an intermittent passive congestion. If there is a wound, ulcer, or other painful area on a limb the instrument can be so adjusted that compression is exerted up to and away from the area so that no pain is experienced by the patient.

It has been found that the best results are achieved if the instrument is applied for one hour twice a day; if less time is given the course of treatment must be of longer duration. The patients can apply and control the instrument themselves, so that in suitable cases a stay in hospital or nursing home is not necessary.

This instrument, under the name of "pneumassage," is manufactured by Messrs. Allen and Hanburys Ltd., Wigmore Street, W.1.

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TREATMENT OF BURNS

In 1942 the Medical Research Council initiated a scheme of research into the treatment of burns and scalds and invited Dr. Leonard Colebrook to organize suitable arrangements at the Royal Infirmary, Glasgow. The impressive volume of studies now issued[1] gives evidence of the success of the venture and encourages the hope that the plan will be extended in the peaceful days to come. Two themes stand out from the many inquiries set in motion by the Glasgow team. The first is that infection must be prevented or reduced if burns are to be healed expeditiously and with minimal disability and death from sepsis eliminated; the second emphasizes the tremendous value of plasma transfusion, so-called "replacement therapy," in the early critical period when fluid is draining away from the circulation, thereby adding serious embarrassment to a patient whose vital reserves are impaired.

The main object of first-aid treatment of burns should be the prevention of streptococcal infection. Haemolytic streptococci are widely distributed in all communities, being recruited from septic sores, sore throats, and "running ears," as well as dispersed in the nasopharynx of many healthy carriers, variously estimated as 5 to 30% of the population. They lurk, too, in the noses of "nasal carriers," whence they continually seep on to handkerchiefs, clothes, hands, finding their way into the air and dust of public places and private houses, where they remain viable for long periods in dust, bedding, and the like. A fresh burn, like any other kind of injury, is thus liable to early contamination unless strict precautions against infection are taken at once. The injured skin should be protected with a recently laundered clean towel or a sterile cloth, and the patient removed to hospital if the burn is severe, where an elaborate attack on what is essentially a major surgical problem can be attempted. If the burn is quite superficial, or in the case of more severe burns when considerable delay in getting into hospital is anticipated, the Glasgow "No. 9" cream should be freely smeared on the affected region. Here, again, contact with infected sources such as blankets is to be avoided, and interference with blisters is not advised. The operator's hands should be thoroughly washed and dried and a gauze mask or clean handkerchief worn over the mouth and nose. The cream—whose chief constituents, cetyl trimethyl ammonium bromide and sulphanilamide, have been the subjects of intensive bacteriological studies by the Glasgow team—should not be left on the burn for more than two days, since there is a slight risk of dermatitis arising if it is left longer.

With the more severe cases a serious strain is placed upon the judgment of the surgeon, for he has to decide whether his treatment shall be directed towards "cleaning up" of the burn or resuscitatory measures against the circulatory collapse which threatens. Experience shows more and more that the prime necessity is the treatment of "shock" rather than infection at this stage, and there may be time only for some slight extension of the correct first-aid measures. When the patient's condition has been restored to a state in which thorough attention to the burn can be given, then an elaborate ritual is instituted. This calls for the elimination of every possible source of infection, whether it be the dust-carrying air of operating rooms and wards, the blanket and bedding and dressings, or possibility of cross-infection from personnel concerned in the treatment. The full discussion of the innumerable sidelines of this complicated business makes fascinating reading in the Glasgow team's report. No aspect of hospital life escapes attention. The difficulties in supply of nurses under the rigours of wartime, troubles over sterilization of blankets and gowns, influence of black-out restrictions and blast walls on ventilation and fumigation, vagaries of the seasons and their disturbance of insect population—all these afford a record of obstacles encountered and overcome against a background of life in a busy institution. And success of encouraging proportions has been achieved, for acute septic infection became rare and fatalities few. Nevertheless, the members of the team feel that further improvement can be achieved in controlling or preventing certain types of infection, especially those arising in the later stages of the sloughing period of deep burns and due to coliform and diphtheroid bacilli, *Proteus*, staphylococci, and at times *Ps. pyocyanea*. The acquisition of infection during the stay in hospital is still a matter for concern, especially in the case of haemolytic streptococci, while there is room for improvement in methods of preventing local fluid loss from burns. Bactericidal agents, too, demand more study. Suggestions for further progress include the institution of centres specially staffed and equipped for the treatment of burns, where there will be close collaboration at all times between the surgical and nursing staff and the investigator; where, in other words, the burns problem will be thought of with due regard to its sociological, therapeutical, and investigational implications. The high incidence of disability from burning is not confined to wartime conditions only, but is a problem of considerable national importance at all times and deserves serious consideration in schemes for improving the nation's health.

The second theme of the Glasgow team's report is the value of replacement therapy in the treatment of burn shock. Fluid loss from a burnt area may go on for 24 to 30 hours, leading to serious haemoconcentration and, if untreated, precipitating a circulatory crisis which too often proves fatal. Since the primary consideration in these grim cases must be the preservation of life, it is very important that guiding principles be laid down for variable conditions of injury. These the Glasgow workers have

[1] *Studies of Burns and Scalds—Reports of the Burns Unit, Royal Infirmary Glasgow, 1942-3.* Med. Res. Cncl. Sp. Rep. Ser. No. 249, H.M. Stationery Office, 1944. (4s.)

been able to formulate. With fluid replacement, for instance, there is no short way out through calculation by means of formulae. Careful study of each individual is necessary, preferably using serial determinations of the haemoglobin value and the blood pressure. Adults with burns of over 15% of the body surface, and children with burns of over 5 to 10%, require generous transfusions which will make good the fluid loss and prevent haemoconcentration. Complete cleansing and dressing of the burns should be postponed, even until the second or third day, while the problem of fluid wastage exists. No time must be lost in instituting adequate replacement therapy; even a short delay may be followed by the most serious outcome. The absence of striking changes in the blood picture and blood pressure is no reason for complacency, and the surgeon must concentrate on maintaining a circulatory blood volume as nearly unchanged as possible in order to safeguard against "shock" and its complications. Even when the initial difficulties are safely overcome there remain a number of problems, many of which are still being investigated. Anaemia often enough develops, nitrogen equilibrium is disturbed, while plasma protein loss has to be made good through the regenerative powers of the individual. Progress in these complex matters can be made only by the co-operation of highly trained members of a team. The Medical Research Council workers have shown what can be done in this way, but a great deal still remains to be tackled.

NUTRITION AT HOME AND ABROAD

It is now more than two years since the *Times* advocated the formation of a Nutrition Council in a leading article which stressed the importance both of keeping in touch with nutritional trends at home during the war and of providing machinery for the rapid assessment of malnutrition in reoccupied Europe in order to obtain the most rapid and efficient administration of food relief.[1] Letters to the *Times* and leading articles in this *Journal*[2] continued the debate; and, although they differed about the best way to set up a Nutrition Council, they agreed that such a body should be formed. A year ago an analysis of the situation, based on a report to the Parliamentary and Scientific Committee, was made by Dr. John Yudkin,[3] who pointed out that a comprehensive food policy must include, first food production, secondly food distribution, and thirdly nutritional surveys, with a view to determining whether the object of production and distribution—adequate nutrition—was being achieved.

It is opportune now to look at the more immediate problems of wartime nutritional trends at home and to the relief of malnutrition in Europe. A quick glance shows that the picture is confused. The Ministry of Food has made its own surveys and has a fairly clear idea of what ordinary working-class families are eating. Comprehensive investigations have been made by the Oxford Nutritional Survey. But none of this work has been published, and so we are left with the impression that systematic, repeated nutritional surveys at home have been few. Davidson and his colleagues[4] have reported on a large number of haemoglobin estimations, which indicate a fall in the earlier years of the war and a slight rise during the last two years. Yudkin[5 6] found an increase in the heights and weights of Cambridge school-children between 1942 and 1943 and in the weights of factory workers between 1941 and 1943. There have been other *ad hoc* clinical investigations. But certainly there is not enough published evidence to justify the statement often made that the nutrition of this or that group, or of the country as a whole, is satisfactory.

On the basis of a report by Magee[7] the *Times*[8] concluded that "the nutritional condition of the population is well maintained and may even be improving." The report is based on three nutritional surveys, carried out in 1942 by Sydenstricker, in 1943 by Hawes and Stannus, and in 1944 by Adcock and Fitzgerald. According to their figures the proportions of subjects who were of "good" nutrition were 77% in 1942, 82% in 1943, and 94% in 1944. But are these valid data for demonstrating a supposed improvement in nutritional state between 1942 and 1944? First, the methods of assessment were clinical, and anyone experienced in this type of work will agree that observations from three sets of observers, however well versed in each other's ways, cannot be compared except with the greatest of reservations. Secondly, the places where the surveys were carried out differed appreciably in economic status. The survey of 1942 was made in areas "selected with one exception because of their bad economic history"; the survey of 1943 was in areas many of which had suffered from the depression; and the survey of 1944 included many areas in which the economic situation was good, and few in which it was bad. It therefore does not seem possible to accept the figures—as the *Times* has done—as an index of "well-maintained" or even "improving" nutritional state. The figures quoted by Magee cannot be taken to show anything other than that nutritional state is dependent on economic state—a common enough observation, which was nevertheless well worth repeating.

The question of the relief of Europe is critical, and even if there is a grave lack of transport there does not seem to be a clear-cut plan for the supply of food to liberated areas. Have the military authorities organized the rapid, mobile nutritional teams suggested in the *Times* two years ago? Or are they leaving it to U.N.R.R.A., and, if so, where are *its* teams? The need for emergency relief foods is urgent, and the means to distribute them quickly and widely must be found.

NEW WAYS OF GIVING PENICILLIN

The great drawback to systemic penicillin treatment is the necessity for either continuous or frequent administration. The drug is rapidly absorbed and excreted in the urine, so that intramuscular injection must be repeated regularly every three hours if an adequate level is to be maintained in the blood, unless a continuous drip, either intravenous

1 *Times*, Sept. 28, 1942.
2 *British Medical Journal*, 1942, **2**, 640.
3 *Food Manufacture*, 1943.
4 *British Medical Journal*, 1942, **2**, 505; 1943, **2**, 95; 1944, **1**, 76.
5 Ibid., 1944, **2**, 201.
6 *Publ. Hlth.*, 1944, **57**, 109.
7 *Monthly Bull. Min. Hlth.*, 1944 **3**, 146.
8 *Times*, Sept. 25, 1944.

or intramuscular, can be established. One way of overcoming this difficulty would be to secure delayed absorption from the site of injection, so that less frequent doses would be necessary. Two methods of doing this have been devised, and both have been applied so far, not to relieving the seriously ill patient from his dreaded nocturnal awakenings by the needle but only to reducing the number of injections required for curing gonorrhoea from the usual five or six to only one. M. J. Romansky and G. E. Rittman[1 2] have made a suspension of calcium penicillin powder in a mixture of beeswax and peanut oil; a single intramuscular injection of 100,000 units or less of this preparation will maintain an adequate blood level for 7 hours or more, and cured 11 out of 12 cases of gonorrhoea. An alternative method used for the same purpose by M. Trumper and A. M. Hutton[3] was to strap an ice-bag to the arm for 2 hours before and up to 12 hours after injecting a watery solution of penicillin into the deltoid. Chilling caused diminished circulation and hence slow absorption. A single dose of 50,000 units maintained an adequate blood level in most cases for as long as the ice-bag was kept in position, and sufficed for the cure of 17 cases of gonorrhoea, the only failure being in a man who received a smaller dose.

An alternative method of maintaining the blood level is to obstruct renal excretion. The capacity for retaining penicillin is probably the only advantage to be gained from having nephritis. Patients with damaged kidneys in whom a high blood level persisted for 8 hours or more after their last dose have been reported by several writers, but the two patients described by J. H. Humphrey[4] are so far unique. A single dose kept their blood bacteriostatic for nearly five days. This was the consequence of an extreme oliguria, and since the urine passed had the composition of almost pure glomerular filtrate, and contained no detectable penicillin, it is suggested that the drug is normally eliminated by the tubules. This excretory mechanism has previously been surmised on the ground that the excretion of other substances by the tubules will delay that of penicillin. Diodrast was shown to have this action by C. H. Rammelkamp and S. E. Bradley,[5] and it is now reported by K. H. Beyer *et al.*[6] that the same effect can be obtained with para-aminohippuric acid. In the experiments described this substance was given by continuous intravenous infusion. If no simpler method of administration will serve, this proceeding is unlikely to become popular in clinical practice.

With supplies of penicillin rapidly increasing, the time may come when less attention need be given to economy and a greater consideration will be the patient's comfort. This happy prospect has led A. H. Free *et al.*[7] to reconsider the possibility of giving penicillin by the mouth. This route has hitherto been firmly ignored because the drug is destroyed by acid, and even administration by duodenal tube has resulted in poor absorption. With a much larger dose the result might be different, and these authors therefore caused four normal subjects to swallow a single dose of 100,000 units. Blood titrations were not done, but the amount excreted in the urine was determined, and varied from 8,800 to 33,600 units: presumably gastric secretory activity was the main factor in this variation, and it would be interesting to be able to compare these figures with the results of test meals. The sufferer from achlorhydria should be at a great advantage when penicillin is given by this route, and diminished gastric secretion is said to be a common accompaniment of severe febrile illness. Oddly enough, when sodium bicarbonate was given at the same time the output of penicillin was much less. Renal excretion, though greatest in the first hour, was substantial up to the fourth hour; action may therefore be more prolonged than that after intramuscular injection. It need scarcely be said that this wasteful method of administration is quite unjustified at the present stage, but it may repay further exploration in the coming age of plenty.

1 *Science*, 1944, **100**, 196.
2 *Bull. U.S. Army med. Dept.*, 1944, No. 81, 43.
3 *Science*, 1944, **100**, 432.
4 *Nature*, 1944, **154**, 765.
5 *Proc. Soc. exp. Biol.*, N.Y., 1943, **53**, 30.
6 *Science*, 1944, **100**, 107.
7 Ibid., p. 431.

NON-MAGNETIC INTRAOCULAR FOREIGN BODIES

Intraocular foreign bodies present a series of related problems: the injury induced by the entry of the foreign body, the liability to infection, and the irritant action of the foreign body. The matter is rendered still more complex by the danger of sympathetic ophthalmia arising from any perforating wound of the eye. The one relieving feature in this picture is the success that has attended magnet extraction of foreign bodies since the procedure was first introduced by Dixon in 1859. In peacetime industrial accidents are responsible for most of the eye injuries with retained foreign body, and two out of three such foreign bodies are magnetic. The proportion of non-magnetic to magnetic foreign bodies was much higher in the injuries seen in the last war than in industrial accidents, and this unfavourable disproportion has become still more accentuated during the present war. This has come about because of the increasing use of aluminium in the manufacture of projectiles, and except for shell and bomb fragments most missiles may now be regarded as non-magnetic. The position thus created was the subject of a Hunterian Lecture by Mr. L. H. Savin two years ago, who brought the subject up to date in a paper at the Royal Society of Medicine last week. In his Service patients with retained intraocular foreign body the proportion of magnetic to non-magnetic foreign bodies was one in six, and it was still more unfavourable in air-raid casualties, who showed a proportion of one in nine. The use of the sulphonamides is an innovation that materially helps to combat the attendant infections, but the gravity of the problem of these retained foreign bodies is made more real by our ignorance of the reaction of the eye to aluminium. Leber had shown that intraocular foreign bodies could be classified chemically as inert, weakly active, and violently active. Chemically stable foreign bodies were not acted upon by blood or tissues, and might remain in the eye for years without causing inflammation. In contrast to gold and glass, which were thus inert, iron and steel gradually became oxidized, were taken up by the ocular tissues, and induced degenerative changes, while mercury—and to some extent copper—led to suppuration.

In a series of carefully planned experiments on the rabbit Savin studied the reaction of the eye to aluminium. Fragments of pure aluminium and various alloys were implanted into the anterior chamber, vitreous, or on to the retina, and in every case changes took place in the fragments. Pure aluminium may be absorbed completely, but more often the fragment becomes coated with a white deposit of aluminium hydroxide, or with fibrin and gelatinous material. In many cases the metal crumbled and pieces became scattered. Lens and vitreous changes were late results in almost all cases, and there was evidence of retinal damage. These experimental results were supported to some extent by clinical observations in a patient he had under observation. It is thus clear that aluminium is not inert, and its removal from the eye presents a formidable surgical problem. Accurate location of these non-

magnetic foreign bodies is essential, as a successful forceps extraction is more likely in the anterior segment of the eye than in the posterior segment. Stressing that in the vitreous and retina the odds are against the surgeon, Savin advises, pending improvement in technique, that the surgeon should attempt removal only in those cases in which clinical observations show the foreign body to be deleterious. This is sound but depressing advice.

THE PSYCHIATRIST AND THE PSYCHOLOGIST

Psychiatry has made big strides during the war and is now being applied to other than strictly medical problems. For instance, psychiatrists are now employed by the Army to advise upon the likelihood of a given cadet becoming a useful officer. This tendency is to be welcomed. Such work provides an excellent education for the psychiatrist; and temperamental factors, on which the psychiatrist is entitled to speak with some authority, have a clear bearing on the problems of personal selection. The psychiatrist has thus begun to tread on the territory of occupational psychology, and the common field of activity has become a Tom Tiddler's ground disputed by both.[1-4] It is clearly desirable to find a compromise satisfactory to psychiatrists and psychologists alike. Though the psychiatrist and the psychologist are at times concerned with the same problems, they approach them from different standpoints and with types of experience that are complementary. Clearly, what is required is the closest and most friendly collaboration. When a psychiatrist says that because of certain temperamental qualities a healthy man is unsuited to become an officer he is working by a rule-of-thumb method which has not been fully proved. He does not know how many men who have proved themselves satisfactory officers in the hard school of experience have been possessed of these same temperamental qualities. On the other hand, actual neurotic symptoms, which may be concealed until inquired into, are the peculiar province of the doctor and are known to be incapacitating. Where the psychiatrist approaches the problem from the point of view of the morbid the psychologist approaches it from the point of view of normal variation. His training has proceeded along very different lines. In order to solve the problem of which men are most suitable for certain jobs, and what jobs are most suitable for certain men, he has been taught to examine the requirements of the job, to devise tests for these requirements, and to try out these tests on an adequate scale before putting them extensively into operation. His training has provided him with knowledge of a number of different classes of occupation, and with a familiarity with an armoury of scientific and statistical techniques which are and must remain beyond the reach of any but a few medical men. To the bystander it would seem that both types of experience are needed for a solution of the problem, and that while the psychiatrist should claim final judgment about the handling of the man who through neurosis or other cause has fallen below his usual level of efficiency, he should admit the greater appropriateness of the psychological techniques of vocational guidance and personal selection for the placing of men who are medically healthy and well. The problem of placement may, however, in the individual case have an unmistakably therapeutic aspect, and where this is so the doctor should be consulted. Although the psychologist may have suggestions to offer on the subject of treatment—e.g., in the neuroses or in disorders of behaviour—the final decision must lie in the hands of the doctor. In recent years, particularly in the field of child psychiatry, psychologists have sometimes embarked on the treatment of individual patients without adequate medical supervision. It is to be hoped that the unsuitability of this arrangement will be recognized by psychologists themselves.

[1] Gregg, A., *British Medical Journal*, 1944, **1**, 550.
[2] Rodger, A., *Occupational Psychology*, 1943, **17**, 194.
[3] Gillespie, R. D., ibid., 1944, **18**, 112.
[4] Rodger, A. ibid., p. 115.

INTRATHORACIC NERVE TUMOURS

Tumours originating from nervous tissue are not uncommonly found in the chest; they are usually termed benign new growths, but their pathology receives little attention in standard textbooks. Such tumours are often symptomless, or very nearly so; they are often discovered by accident, when the chest is radiographed for some other reason. Mass miniature radiography will therefore probably reveal quite a number of these growths; in fact, Brooks[1] reported finding 4 intrathoracic neurofibromata in a series of nearly 2,000 healthy men examined by this method, and these amounted to one-third of all the tumours discovered in this group. An authoritative account of intrathoracic nerve tumours by Kent, Blades, Valle, and Evarts Graham[2] is therefore particularly welcome. These authors attack the prevailing misconception that these tumours are benign. In their small series of 18 examples no fewer than 7 showed definite malignant change. They have also collected 105 cases from the literature, 39 of which were considered to be malignant, and they point out that this proportion of malignancy corresponds to that found among nerve tumours elsewhere in the body.

Neurofibroma is the commonest tumour of the posterior mediastinum and posterior part of the superior mediastinum, and almost invariably favours these sites. The origin of the growth is still doubtful; it probably arises in a nerve sheath, either from the connective tissue or from the cells of the sheath of Schwann. The type most usually encountered in the chest consists of fibrous tissue with some nuclear clumping and palisade formation, as seen in a Schwannoma; this tumour grows from the intercostal nerves. A less common variety, which contains numerous multipolar ganglion cells, is usually termed a ganglioneuroma and may arise from the sympathetic system. Some neurofibromata show both types of structure. It is not uncommon for the tumour to originate within an intervertebral foramen, in which case it often extends into the spinal canal. The symptoms may be very few: pain is not uncommon, and other effects occur as the result of pressure or nerve involvement. *X*-ray examination shows that the tumour is usually single, rounded, homogeneously opaque, and situated in the paravertebral region; pressure may cause erosion of neighbouring ribs. A lobulated appearance may be due to rapid growth and indicate malignancy; but the presence of an effusion does not necessarily mean that the tumour is malignant.

The best treatment for an intrathoracic neurofibroma is surgical removal; usually this is not difficult, though an extension into the spinal canal may occasionally give trouble. These tumours are not sensitive to irradiation, and the proved high incidence of malignant change does not justify the policy of waiting for pressure effects to appear before advising operation. Kent and his co-workers conclude their account of these tumours with an illustrated record of all their cases, which will be most instructive to those interested in the subject.

[1] *Proc. roy. Soc. Med.*, 1942, **36**, 155.
[2] *J. thorac. Surg.*, 1944, **13**, 116.

The Joint Tuberculosis Council and the National Association for the Prevention of Tuberculosis have arranged a refresher course for tuberculosis officers and medical practitioners, to be held in Manchester at the University, Oxford Road, from April 23 to 26. The fee of £4 4s. is payable in advance to Dr. Harley Williams, Tavistock House North, Tavistock Square, London, W.C.1.

A YEAR'S WORK AT A WARTIME NURSERY

BY

J. L. BLONSTEIN, M.R.C.S., L.R.C.P.

The following is an account of a year's work at a wartime day nursery (Battersea Central Mission) established in a much-bombed area in London. The nursery is open to children between the ages of 2 and 5 whose mothers are doing war work. The mothers pay a shilling daily, while the Ministry of Health contributes a shilling a day per child.

The nursery is housed in seven rooms each 20 ft. by 15 ft. on one floor, and there are three rest rooms, one dining-room, one isolation room, one schoolroom, and one playroom. In addition there are two bathrooms and two lavatories. There are two women cleaners who work full time.

The average number of children attending daily (except Sundays and bank holidays) from April 1, 1943, to March 31, 1944, was 50. There were twenty boys and thirty girls. They spent on the average eleven and a half hours (7 a.m. to 6.30 p.m.) daily at the nursery. A matron (State-registered nurse and registered fever nurse) is in charge, and there are one State-registered nurse, one teacher, and four junior nursery assistants. The medical officer attends on one set afternoon weekly. He examines new entrants and re-examines at regular intervals children already admitted. Children are immunized against diphtheria (one injection 1/2 c.cm. A.P.T.) and given prophylactic inoculations of whooping-cough vaccine with the consent of their parents. The medical officer is on call at any time during the day to attend to emergencies, and children who need treatment at home are referred to their own doctors.

Daily Diet

There is one special cook and one help in a kitchen on the premises. The average daily diet is as follows: *Breakfast.*—Bread, butter, cereals, bacon, jam, marmalade, hot milk. *Lunch.*—Meat, two vegetables (in season), potatoes, gravy, steamed pudding, custard, milk puddings, stewed fruit when available, orange juice. *Tea.*—Bread-and-butter, jam, honey, marmite, grated cheese, green salad (in season), home-made cakes, milky tea. Concentrated orange juice and cod-liver or halibut-liver oil are given daily.

Children up to the age of 3 play with toys and enjoy simple singing games such as "Farmer's in his den" (in the open air, weather permitting). They have regular meal- and washing-times, and spend one and a half hours sleeping in centrally heated rooms, well ventilated, from 12.30 to 2 p.m. Children from 3 to 5 years also enjoy toys and games in the open air and attend a nursery school from 9.30 a.m. to 11.30 a.m. During the two hours' instruction the occupation is changed every ten minutes so that their interest does not flag. They enjoy singing, recitation, percussion band, short stories connected with animal life, fairy tales, and Bible stories. They also sing and clap nursery rhymes and enjoy elementary education, including the alphabet and number activities. They also have physical exercises accompanied by the piano, and often enjoy playing with constructive toys such as building bricks, jigsaw puzzles, and posting boxes.

The average number of days lost through sickness was 7. There were the following cases of infectious diseases: Rubella 4, scarlet fever 2, diphtheria 2, chickenpox 6, and measles 1. Among other illnesses were tonsillitis 6, mastoiditis 1, bronchitis 5, abscess of neck 2, pneumonia 1. The fact that there were no cases of whooping-cough speaks highly for the prophylactic vaccine. Schick tests were performed on all children attending the nursery, and despite the fact that they had all been immunized 23 were positive and re-immunized. Out of the 23 positive reactors 21 came in with a history of having been inoculated at "clinics." It seems, therefore, unwise to rely on the mothers' statements; all new entrants should be Schick-tested.

The average gains in height and weight during the year were as follows: *Height.*—2 to 3 years, 1 to 1½ in.; 3 to 5 years, 1½ to 2 in. *Weight.*—2 to 3 years, 5½ to 6 lb.; 3 to 5 years, 6 to 7 lb.

The above notes are given in the hope that they may be some assistance to medical officers in charge of nurseries or those contemplating their organization.

The January–February issue of *Industrial Welfare and Personnel Management*, the journal of the Industrial Welfare Society, includes an article on the employment of the blind in industry by Major E. Wittkower and Patricia Elton Mayo. This reports six weeks' research work at a factory employing a group of blinded persons. The authors point out in conclusion that the blind are only a section of the severely war disabled, and experience gained from employment of the blind points to the need for an association analogous to St. Dunstan's for the after-care of other severely disabled men.

A PLAN FOR BATH

The "Plan for Bath," prepared by Prof. Patrick Abercrombie, Mr. John Owens, the City Engineer, and Mr. Anthony Mealand, Town Planning Officer, was opened by the Minister of Town and Country Planning, Mr. W. S. Morrison, on Feb. 1, with the Mayor of Bath, Councillor Edgar Clements, presiding.

The Exhibition fills the whole of the Victoria Art Gallery and consists of general and detailed plans, perspectives of many of the principal proposals, maps showing the open spaces, the agricultural belt, and the use of land over the area covered by the proposals. Indeed, one merit of the scheme is that it includes a wide area around the City of Bath. The planners were told by the Bath and District Joint Planning Committee—which, under the chairmanship of Sir Arthur Hobhouse, chairman of the Somerset County Council, was responsible for the proposals—to ignore boundaries. The Exhibition includes diagrams showing the water, drainage, and communications in relation to the surrounding district, and among other things the area served by the Bath Royal United Hospital. There is also an extremely interesting series of plans showing the condition of the Georgian houses and buildings, and how these would be affected under the new plans. Provision has been made for the extension of the bathing establishment, a large concert hall, and recreational facilities. In close relation to the bathing establishment is a site for the new Royal National Hospital for Rheumatic Diseases (Mineral Water Hospital) and a Health Centre comprising facilities for research laboratories and other medical purposes. There is also provision for a rehabilitation centre and hostels for industrial workers who do not need to go into hospital. Furthermore, accommodation is provided for the health department of the city. The Health Centre is almost equal in size to the area of the ancient Roman town of Aquae Sulis.

SUFFERINGS OF OCCUPIED HOLLAND

PROTEST BY DUTCH PHYSICIANS

A strong protest by members of the Dutch medical profession has been made to the German commissary in Holland, Seyss-Inquart, concerning the conditions in the occupied country. The protest is unsigned, but it is said to represent the feelings of thousands of doctors. In the first place the complaint is made that the Dutch Red Cross has been placed under the administration of an individual who does not enjoy the confidence of the Dutch people. The institution, says the letter, has now become a German instrument, with which Dutch doctors can no longer co-operate.

The principal charges made in the letter, however, have to do with the conditions under which the people in the occupied Netherlands now have to live. The German administration is blamed for the increasing shortage of foodstuffs. The rations have a value of 600–800 calories a day, which is less than one-third of what the working adult requires. Milk for small children is insufficient, and special feeding for the weak and ill has been stopped entirely. Tuberculosis, dysentery, diseases of the alimentary canal, and infantile paralysis are declared to be rapidly increasing, while epidemics of diphtheria and scarlet fever have reached proportions hitherto unknown in the Netherlands. The German administration is cited as responsible for this state of affairs, first, because, in contravention of international law, the Germans took away the reserve stocks which were available in 1940, and, secondly, because the Dutch people are now prevented, owing to confiscation of transport, from distributing evenly such food as remains. The Germans blame the Dutch railway strike as the reason for the famine conditions, but it is pointed out that in normal times the railways transported only a small proportion of the supplies.

Still worse are the conditions under which Dutchmen have been rounded up for labour drives. It is stated that these men have been harried until they have fallen from sheer exhaustion and have been crowded together without the elementary necessities of life. One instance is given of a number of civilians in November last who were marched from Rotterdam to Delft in pouring rain and then locked up in trucks without straw, fifty or sixty men to each truck. They had no sanitary conveniences, and they had no food other than what their local compatriots could spare from their own meagre rations. The

hygienic conditions in the camps where these labourers are housed are described as appalling. There is hardly any medical care, and it is difficult to get sick persons taken to hospital. It has even been demanded of the doctors that they should provide a healthy man for every sick one taken away.

If, as a number of highly placed German officers declare, this is not a labour drive but a prisoner-of-war camp, it is pointed out that the conventions relating to prisoners of war are flagrantly contravened.

The letter concludes with a declaration which must have caused the medical profession in the Netherlands, with its great traditions, much heart-searching before it was made—namely, that in view of all these happenings it is becoming increasingly difficult for Dutch doctors to maintain the humanitarian attitude of giving the same attention to both friend and foe.

"You will have to realize that if you wish to make use of the services of the Dutch doctors in the future, such aid will only be given because of professional duty, and because they would not like to be considered as being upon the same level as their opponents. On account of this professional duty, however, the Dutch doctors send you this letter, now that the distress of the people requires them to speak their mind."

Reports of Societies

MALARIA IN BRITAIN

At a meeting of the Fever Group of the Society of Medical Officers of Health on Jan. 12, with Dr. M. MITMAN in the chair, a discussion on malaria in this country was opened by Mr. P. G. SHUTE, Malaria Officer to the Ministry of Health.

Malaria, he said, was endemic in England as late as the 19th century and reached epidemic proportions in certain areas. In 1917–18 a number of cases of indigenous malaria arose from infection of the anopheles by soldiers returning from abroad; in 1917 there were 330, but from 1920 onwards there were very few. In England the only species of anopheles likely to be important in malaria transmission was *A. maculipennis*, which was most densely distributed in low-lying marshy districts. He estimated that possibly hundreds of thousands of malaria-infected troops would return to this country at the end of the war, and the spread of malaria to the civil population was a foregone conclusion. But this prospect was less formidable than it appeared. Infection with *Plasmodium ovale* was readily cured, showed no tendency to relapse, and should not trouble us in post-war years. *Plasmodium malariae*, although it survived in man longer than any other species, was not easily transmitted, since gametocytes (sexual parasites) were rare. European strains of parasites causing malignant tertian malaria readily infected English anophelines, but usually died out in the mosquito before the cycle was completed, unless the atmospheric temperature was 75° F. or higher. Also the attack in man was fairly readily cured, and often tended to burn itself out completely within six months. Only one indigenous case of malignant tertian malaria was reported in this country after the last war, and spread to the civilian population appeared equally unlikely after this one.

In benign tertian infection relapses were common and parasites were available to the mosquito in the peripheral blood for some days before clinical relapses occurred. The parasitic cycle could be completed even at low temperature, and heavily infected mosquitoes could remain infective after they had fed as often as on 30 separate occasions. Infected varieties normally living in close association with man could therefore give rise to many cases of malaria. Benign tertian was the form of malaria most likely to arise as an indigenous infection in this country. With high atmospheric temperatures a few cases of malignant tertian might occur from European strains, but returning troops should not be infective to mosquitoes for more than a single summer. Nevertheless, rapid diagnosis and prompt treatment of indigenous cases were of the utmost importance in view of the known virulence of this species, particularly in a non-immune population.

Prophylactic Measures

In benign tertian infections prophylactic mepacrine offered transient protection only. Returning troops so protected might experience their first attack of malaria many months after arriving in this country, and frequent relapses would follow. Latency was a normal feature of benign tertian infections, but where mepacrine prophylaxis was practised it might be seen in the majority. Neither quinine nor mepacrine possessed gametocidal properties, which were important so far as infectivity to the mosquito was concerned. Pamaquin in small doses of 0.02 or 0.03 g. would destroy gametocytes in 24 hours and could be given on the first and second days of relapse. Mepacrine should not be administered at the same time, but quinine could be used. The value of the mosquito net should be borne in mind, especially in districts where *Anopheles maculipennis* was abundant. The destruction of a few mosquitoes in a house where there was a case of malaria would probably do more to prevent the disease spreading than the destruction of hundreds of thousands of mosquito larvae in their breeding-grounds. Antilarval operations as a general precautionary measure did not appear to be justified, especially where breeding-grounds were extensive. Measures against adult insects would prove the most efficient way of reducing their numbers in any locality. The insecticide used should kill instantly and leave no smell. A number of new insecticides were available, including D.D.T., which promised well, but final judgment on its effectiveness against mosquitoes should be reserved.

Mr. Shute pleaded for early diagnosis in indigenous cases and for a blood film in suspected cases before antimalarial drugs were given. One thin and one thick film should be taken; the first spread so that the red cells almost touched without overlapping; a thick film should be spread over an area the size of a sixpence, and just so thick that print could be seen through the drop of blood when the slide was lying flat on it.

Dr. R. MCCALLUM described 48 cases of benign tertian and 1 case of malignant tertian malaria in soldiers returned from the Middle East. All were mild, with typical clinical courses. Twelve of the men had no history of a previous attack while in the malarious area. In the diagnosis of a primary attack relative monocytosis was suggestive. Treatment was on standard lines with quinine, mepacrine, and pamaquin, and could be completed within three weeks in most cases. As the hospital was in an area potentially malarious owing to the presence of *Anopheles maculipennis atroparvus* with suitable breeding-grounds, precautionary measures included the use of mosquito nets, pyrethrum spraying, and the administration of a dose of pamaquin to the patient. No case of indigenous malaria had occurred in the surrounding population.

The Blood Film in Diagnosis

Major J. W. HOWIE, R.A.M.C., said that some aspects of the laboratory diagnosis of malaria required emphasis. Thin films must really be no more than one cell thick or the stain would not penetrate properly. Thick films were often made too thick; one or two drops of blood were enough, and the blood should be spread gently and evenly so that the hands of a watch could be seen through the dried specimen. He preferred Leishman's stain for thin films and Field's or Giemsa's for thick films. The distilled water must be adjusted to a reaction near neutrality, otherwise malaria pigment and stippling would be missed and differentiation of species would be more difficult, This was important, because relapses in malignant tertian malaria could best be prevented by mepacrine, whereas in benign tertian malaria quinine and pamaquin would give better results.

From each case of suspected malaria a thick and thin film should be made: the thick film was essential when parasites were few, the thin film was needed to determine species. It was sometimes mistakenly supposed that blood films should be taken when the patient's temperature was rising; the chances of detecting parasites were highest if films were made when the temperature was falling, and the absence of pyrexia was by no means a reason for not taking a blood film. Several films should be taken at intervals of 3 to 4 hours; 5 minutes' examination of four films made at these intervals was far more useful than the prolonged scrutiny of a single film. There should be no half-measures about the interpretation. A properly stained film showed unequivocal red and blue staining in the structure of parasites; unless an object in the film showed this, it was not a parasite.

The laboratory worker could help in controlling treatment by estimating the concentration of antimalarial drugs in blood and urine. Some of this work involved complex procedures, but there was one useful and simple test that any laboratory could perform—the Tanret test for quinine in the urine (*Lancet*, 1943, **2**, 317). If this was not positive during quinine administration the disease would not respond: the patient was evading the drug, or his absorption was defective, or his tissues were destroying it with undue rapidity. A persistently positive Tanret test in successive urines would soon be followed by a good clinical response; but if the Tanret test was negative or irregularly positive, quinine or mepacrine must be given parenterally.

It was dangerous to wait too long in serious malignant tertian infections before administering parenteral quinine, which was still the best treatment for cerebral malaria. Quinine should not be given in blackwater fever, but if there was any difficulty in controlling severe malignant tertian infections there must be no delay in giving intravenous or intramuscular quinine. The improvement was usually dramatic, and a patient who had previously vomited the drug could often take and absorb later doses given by the mouth.

A patient whose malaria had rendered him anaemic (red cell count below 2,500,000) would show a reticulocytosis of 10 to 20% over three days or so when his infection was fully controlled. If this reticulocytosis failed to appear in an anaemic patient or a submaximal response—about 4%—was noted, it might be assumed that the infection had not yet been fully controlled.

Dr. C. A. BENTLEY thought the Romanowsky stain was more stable in tropical conditions with high humidity than Leishman's. The persistence of malaria in a locality depended on the ratio of mosquitoes per head of population. Thus the disease would be most unlikely to spread in big towns but might do so in sparsely populated areas in this country. Dr. E. H. R. HARRIES said that the precipitating factor in an attack was often a change of environment or conditions, and the possibility of cerebral malaria in troops returning from abroad must be borne in mind.

Correspondence

Penicillin in Bacterial Endocarditis: Investigation

SIR,—The place of penicillin in the treatment of subacute bacterial endocarditis has not yet been established, although encouraging results have been reported in America, and these suggest that prolonged treatment with large doses may be effective in some cases. It is apparent that more information is required on the effective dosage in relation to the sensitivity of the organism to penicillin, and the Penicillin Clinical Trials Committee of the Medical Research Council has therefore established ten centres in which patients will be treated according to a prepared plan, and with full laboratory control. Physicians are invited to refer patients suffering from subacute bacterial endocarditis to any of the following:

London.—(*a*) Sir Alexander Fleming, St. Mary's Hospital, London, W.2. (*b*) Resident Medical Officer, Middlesex Hospital, London, W.1. (*c*) Prof. R. V. Christie, Hill End Hospital (St. Bartholomew's), St. Albans.

Liverpool.—Prof. Henry Cohen, Department of Medicine, the University, Liverpool, 3.

Sheffield.—Prof. E. J. Wayne, Royal Hospital, Sheffield, 1.

Leeds.—Dr. J. R. H. Towers, 42, Park Square, Leeds, 1.

Manchester.—The Resident Medical Officer, Manchester Royal Infirmary, Manchester, 13.

Bristol.—Prof. C. Bruce Perry, Department of Medicine, Canynge Hall, Whatley Road, Bristol, 8.

Edinburgh.—Dr. A. R. Gilchrist, Royal Infirmary, Edinburgh.

Belfast.—The Secretary, Belfast Penicillin Clinical Trials Committee, Queen's University Institute of Pathology, Grosvenor Road, Belfast.

—I am, etc.,

RONALD V. CHRISTIE,
Secretary, Penicillin Clinical Trials Committee.

Penicillin

SIR,—I was very much interested in the excellent series of articles that you have published on penicillin in your issue of Jan. 27. Those of us not yet privileged to have a supply other than what we can make for ourselves will have to possess our souls in patience till such supplies are available.

In company with many other people I was greatly surprised at an article in the daily press of a week or two ago quoting a case that had had about 900,000 units of penicillin, and stating that the cost of this was £400. This agrees with the cost alleged to have been incurred in treating another case, so there would seem to be some foundation for the rumour, though it is a little difficult to see how the information can have leaked out, seeing that the stuff is not on the open market as yet. If this is indeed the price that the "penicillin ring" is demanding the firms involved should surely be called upon to justify such an inordinate charge. I have myself taken a hand in making penicillin (though the peculiar state of the law only permitted it to be given away), and am quite sure that there is no valid excuse for the cost to be as much as a tenth of that amount.

I note further that each ampoule is marked with an expiry date. It would be interesting to know what happens to these ampoules in hospitals carrying a large supply. If kept in a refrigerator the worst that happens is surely only a fall in titre, and there must be hundreds of people who would give their eyes for the use of these ampoules, even if their titre is diminished, rather than they should suffer the fate of being merely discarded.

There was one other point of interest in the article by Dr. G. H. Tee (p. 118) on a case of meningococcal meningitis treated with penicillin. He states that penicillin was given with good results, but that a change to sulphamezathine allowed a relapse to occur with temperature up to 104°. This is so strikingly at variance with the remarkable effect of sulphamezathine given *ab initio* that it would seem necessary to consider the possibility that the penicillin may have some influence in spoiling the effect of the sulphamezathine in much the same way that the converse is supposed to occur.—I am, etc.,

Haywards Heath. J. W. SHACKLE.

The Action of Penicillin

SIR,—With reference to your recent articles and leader on the action of penicillin (Jan. 27, p. 123), it is interesting to recall the work of Louis Pasteur, our greatest benefactor, who, as far back as 1865, established the fact that *Penicillium glaucum* was endowed with chemical properties of a highly selective nature.

All students of chemistry are familiar with the history of the tartrates, and how the laevotartaric acid can be separated from paratartaric acid by the action of the mould, which destroys the dextro-acid. *Penicillium notatum* is now known to have an even more astonishing selective action—that of destroying micro-organisms without damaging tissue cells. Is it possible that penicillin has the power of breaking down some chemical body present in the organism and/or essential to its existence, and which may exist in some of their offspring in an isomeric combination, and thus account for the "persisters"? Possibly those who have studied the chemical action of penicillin could throw some light on the matter and produce evidence to disprove any such theory. In the meantime we are faced with the fact that two members of this family are endowed with selective powers, which should be an additional stimulus to research among the lower forms of vegetation in the hope that we may find a further ally capable of penetrating the hide of the tubercle bacillus.—I am, etc.,

Uley, Glos. J. G. FAYRER HOSKEN.

Treatment of Trachoma with Penicillin

SIR,—A number of Russian nationals have been treated for trachoma in this hospital. These cases have been seen by Mr. G. W. Black and diagnosis confirmed. Every case showed a well-marked vascularization of the cornea and pannus formation, especially of the upper tarsal conjunctiva.

Case 1.—Admitted with a chronic ulcer of right side of neck, proved later to be tuberculous, secondary to a tuberculous adenitis. Intramuscular penicillin (384,000 units) was given, the secondary

infection resolving, and the ulcer at last showing evidence of healing. At the end of the course he was noticed to have a conjunctivitis, diagnosed on examination to be trachoma. Penicillin drops (16,000 units per c.cm.) given 3-hourly. The inflammation subsided rapidly; reduction in pannus noticeable. No evidence of recurrence yet.

Case 2.—Diagnosis of trachoma. Penicillin 16,000 units per c.cm. given; 3-hourly drops in both eyes for 3 days.

Cases 3 and 4.—Both had bilateral trachoma. These cases were given the standard treatment—a 25-g. course of sulphathiazole followed by mercuric oxychloride 1/1000 drops, and copper sulphate 1/1000 4-hourly, treated at the same time as Case 2, and used as controls.

In Case 2 the inflammation of the conjunctiva resolved rapidly, and photophobia diminished quickly; the eye was practically clear in 3 days. In Cases 3 and 4, at the end of the standard treatment (3 days) the conjunctiva was still inflamed and the photophobia undiminished. These cases were given the above course of penicillin and resolved rapidly.

These four specimen cases of trachoma resolved rapidly under penicillin treatment. It still remains to be proved that it has a specific effect on the "virus" causing the disease, or whether the effect is only transitory, clearing up the secondary infection present in all these cases. I am unfortunately unable to follow up these cases to see whether the condition recurs.

My thanks are due to the medical superintendent, Dr. J. N. Hill, for permission to publish these cases, and to Dr. J. Heggie for the supply of penicillin.—I am, etc.,

County Hospital, Otley. G. H. GILFORD.

Immediate Repair of the Cervix

SIR,—I agree with Mr. Mortimer Reddington's plea for attention to the cervix after delivery (Jan. 13, p. 60) and his reference to the unfortunate results if such care is not given, but would like to make the following observations based on a considerable number of post-natal examinations carried out about six weeks after delivery.

1. Satisfactory results are obtained by application of coagulation diathermy to superficially damaged cervices at about the sixth week post partum or even later.

2. Deep tearing of the cervix rarely occurs when relaxation and dilatation are encouraged by the use of chloral hydrate or possibly pethidine, with avoidance of mechanical dilatation or attempted delivery by forceps before full dilatation, or by Caesarean section in certain selected cases.

3. Difficulty is experienced in obtaining a satisfactory and permanent result by primary cervical suture, even under good conditions in hospital. I have twice found the external os almost completely occluded by sutures.

For the arrest of haemorrhage immediate suture may be necessary, but I submit that the majority of patients whose cervices are torn may be saved from any of the future complications enumerated by Mr. Reddington by coagulation diathermy or, in a very few instances, by trachelorrhaphy at a later date. In spite of the fact that immediate repair of the cervix is advised in many standard works on obstetrics, there seems to be a wide discrepancy between theory and practice, for, on inquiry, I find that such a step is rarely deemed necessary in some of the largest maternity hospitals, and for similar reasons to those I have given.—I am, etc.,

Liverpool. S. B. HERD.

Episiotomy and Perineal Repair

SIR,—It is gratifying to see so much correspondence in the *Journal* these days on the important subjects of episiotomy and perineal repair. Dealing with the perineum, Mr. Mortimer Reddington summed up the matter well when he wrote recently, "In a few well-applied and knowledgeable stitches you may secure the whole of a woman's happiness" (*Clin. J.*, 1944).

I heartily endorse Mr. Reddington's letter (Jan. 13, p. 60) on the subject of immediate repair of the torn cervix. In my experience, however, perineal and cervical repair can be carried out just as efficiently in a country cottage as in a hospital, provided one has taken the trouble to draw up a well-prepared plan in advance to deal with the condition. Mr. F. Neon Reynolds's letter (Jan. 27, p. 128) is excellent and contains many points worthy of close attention. I, too, am opposed to midwives doing episiotomy, and agree that Dr. Flew's indications are rather wide.

The idea that the stretched perineum is anaesthetic to any appreciable degree is pure myth. Few other subjects abound with such myths as does obstetrics. In few other subjects is the truth more obvious. To perform episiotomy, or to repair a torn perineum, without adequate anaesthesia is in all circumstances inexcusable. In a hospital pentothal is admirable for episiotomy. Local analgesia, however, is excellent when kindly used, and is undoubtedly the ideal for perineal repair. Nupercaine 1 in 1,000 in normal saline, with adrenaline 0.001%, and without the addition of irritating preservatives, is the best solution to use. Both in quality of anaesthesia and freedom from tissue irritation this local anaesthetic surpasses all others.

Regarding the technique of perineal repair, may I stress one or two points?

(1) In infiltrating the tissues with local analgesic the needle should be passed under the skin edge, not through the sensitive perineal skin. I use a 2-c.c. syringe fitted with a No. 17 needle for infiltration, and have found this size most convenient.

(2) Before suturing it is a good idea to bathe the wound with proflavine 1 in 1,000 in normal saline, buffered to a *p*H of 6.3.

(3) Surgeons in this war have realized that the smaller the amount of catgut used in wounds the better the healing and the less the chance of infection. Mr. Herbert Haxton (Jan. 13, p. 61) has given an excellent account of the disadvantages of catgut. It has to be used for cervix, vaginal wall, and, sometimes, deep in the perineum. However, it is a good idea to bear in mind that the less catgut employed the better.

(4) For the perineum itself I have found Coats's black cotton thread, No. 10, to be the ideal suture material from every point of view. It should be wrapped loosely on a gauze swab and boiled along with the instruments.

(5) If it is apparent that a perineal repair will take considerable time, the value of premedication should not be forgotten. The mental atmosphere throughout labour should be one of tranquillity and calm, not one of fear and terror. It is the bounden duty of everyone attending women in labour to do their utmost to attain to this end.—I am, etc.,

Edinburgh. JAMES ROSS, M.B., CH.B.

The Harvard System

SIR,—On behalf of many readers like myself who must perforce spend a considerable time in perusing original medical articles and in looking up the references contained therein, I should like to protest against the retention of the so-called "Harvard" system of annotation. Of all possible systems of reference this is surely the worst.

An article is meant primarily to be read as a whole, and only those specially interested will look up the references it contains. From the normal reader's point of view, the "Harvard" system may completely destroy any interest he may have felt on seeing the title of the article. The many authors' names are interspersed in the text like the stones in a cherry pie, and produce mental indigestion unless discarded. I have picked one paragraph at random from the *Journal* of Jan. 27 (p. 116) to illustrate my meaning. I trust that Dr. Berger will not think that I am criticizing his style in any way whatever, but I am only calling attention to the reference system, for which he is in no way responsible.

> Methods for extraction and purification of penicillin are all based on the observation that this substance can be extracted from strongly acidified aqueous solutions into ether, amyl acetate, or chloroform, and re-extracted from the organic solvent into water at *p*H 7 (Clutterbuck *et al.*, 1932; Abraham *et al.*, 1941; Meyer *et al.*, 1942). Further purification is achieved by chromatographic methods (Abraham and Chain, 1942; Catch *et al.*, 1942).

Small superior numerals, thus [1], obviate all distraction from the main theme and serve the same purpose with economy of space, as the "Harvard" system duplicates all the names in an alphabetical list at the end of the article.

Now for the point of view of the "looker-upper." What could be more annoying than trying to find *Brit. med. J.*, 1945, **1**, 116, without the date from a pile of these journals in a box? The date "Jan. 27" solves the problem at once. The volume number sounds simple enough, but in practice is often the reverse. In the first place, it may not be printed on the periodical cover at all, as in the case of the *British Medical Journal*. In other cases several numbers are printed. The

current *Lancet* has on the front page "No. IV of Vol. 1, 1945. No. 6335, Vol. CCXLVIII." Why not call it "Jan. 27" and have done?—I am, etc.,

St. Albans, Herts. C. LANGTON HEWER.

*** In 1936 the Royal Society held a conference of editors of scientific journals with a view to persuading them to adopt a uniform system of giving bibliographical references to scientific articles. It favoured what it called the "Harvard system," to which Dr. Langton Hewer objects. The following points are thought to be in favour of this system: (1) In the text it gives the reader two relevant pieces of information—the name of the author of a statement, observation, or theory, and the date on which these were published. (2) It makes it easy to assemble the references in alphabetical order at the end of the paper. (3) Additional references can be inserted at the last minute without having to waste time and money in renumbering and in resetting numerous lines of text and references. The example quoted by Dr. Hewer illustrates the one weakness of the system, and in such an article there is something to be said for using superior numerals as indices. Periodicals are eventually bound in numbered volumes and are thus stacked on library shelves—a seemingly good reason for giving the volume number and not the date. We might add here that the origin of the term "Harvard system" is obscure. It was at all events not introduced by Harvard University. It is believed that an English visitor to the library of Harvard University was impressed by the system of bibliographical reference in use there, and dubbed it the "Harvard system" on return to England.—ED., *B.M.J.*

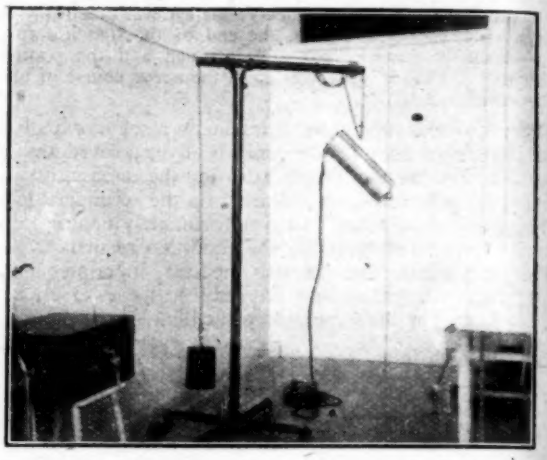
The Giant Magnet in Ophthalmic Battle Casualties

SIR,—In your issue of Nov. 18, 1944, R. E. Wright and H. A. G. Duncan draw timely attention to their experiences with the giant magnet for metallic intraocular foreign bodies in recent battle casualties. The ophthalmologists of the Central Mediterranean Force have had unrivalled experiences during the past two years in the treatment of such cases, and it may possibly be of value at this time to add their conclusions to those of the above commentators.

Magnet Tests.—(*a*) Direct Ophthalmoscopy: It is frequently possible to carry out a giant-magnet test under direct ophthalmoscopy. Thus an impacted foreign body may be seen to rotate in its bed or to rise on the end of a filamentous pedicle to the attraction of the magnetic flux, only to fall back again into position when the current is switched off. This test is the best of all. (*b*) Subjective Response: The negative reaction of the patient to the application of the giant magnet either in the non-anaesthetized or anaesthetized eye is of no value whatsoever. A positive response is of value, but should only be obtained with great caution and with the slow approach of the magnet to the eye; retinal disturbances may be caused or aggravated by repeated magnet applications. (*c*) Direct Vision: Sometimes strong oblique illumination from the head of the ophthalmoscope will show the movement of a foreign body behind the lens in a murky vitreous when the active magnet is applied.

Operation Technique.—(*a*) Since intraocular foreign bodies received in battle are relatively large and ragged the posterior route of extraction is our method of choice. There is no resemblance between these foreign bodies and the smooth flake-like chips received in civil life, which can frequently be wheedled into the anterior chamber prior to extraction. (*b*) As Wright and Duncan point out, the shortest route to the exterior is generally the best. Particularly so is this the case when a foreign body is enmeshed in a pedicle: extraction should then always be through the base of that pedicle and not against it. (*c*) The value of diathermy is still a matter of opinion. Some surgeons say that it causes the scleral wound to gape and may entangle the foreign body in exudate. There is no convincing evidence that retinal detachment is prevented by it or is more frequent without it. Other surgeons say that the risk of haemorrhage is less and that detachment is prevented by the coagulation. There has been no case to date of retinal detachment following uncomplicated posterior sclerotomy in this Force so far as I am aware, but the haemostatic value is considerable. Posterior sclerotomy is considered to be justified in every case of intraocular foreign body, and it is interesting to note that Stallard in his classical article (*Brit. J. Ophthal.*, March, 1944) reports 3 cases in which the foreign body was easily removed by the magnet when there had been no apparent movement ophthalmoscopically to magnetic attraction: these might well have been considered as non-magnetizable foreign bodies had operation not proved otherwise. Nor does every surgeon here use scleral stitches: some claim a simple incision without diathermy heals quickly and gives the best results. (*d*) The composition of a foreign body found in the skin of the face bears no relationship a foreign body which may be in the eye. Indeed, cases have b reported which had two different kinds of metal, or stone and met or different inert foreign bodies in the same eye.

Localization.—In military practice it is not possible or necessa to employ the elaborate methods of peacetime localization techniqu In this Force two methods are popular: (i) By the 26-mm. equ torial ring. Skeoch popularized this method, and it has proved great value. No claim for extreme accuracy is made, but it serv most purposes under war conditions. (ii) By the limbal ring, whic we borrowed from our colleagues in the Middle East, where it w introduced by Brigadier Graham. Two lateral shifts and one ante posterior petrous-free views are taken in each instance.



Magnet Stands.—In the early days many weird and wonderf devices were constructed to carry the Army portable giant magnet and perhaps the only criticism which could be made, since they a worked, was that they were not sufficiently portable. Now, however the R.E.M.E. have constructed a simple standard C.M.F. gia magnet stand on the gallows principle, whereby the magnet i suspended on an adjustable wire cable and counterpoise, as show in the photograph. In this manner the magnet is easily manœuvre to all positions whether the patient is sitting or recumbent. Thi model is based on a similar pattern designed by Lieut.-Col. Dans Browning in the Western Desert.

Anaesthesia.—The anaesthesia which has been found to be mos suitable for magnet extraction cases is: forward areas, induction b 5% pentothal with continuous 1/2% pentothal drip and oxyge (It is to be remembered that major surgical procedures may b simultaneous under these conditions); base areas, local analges with 4% cocaine drops and subtenon 2% novocain infiltration.

May I conclude, Sir, with the statement that any "follow up" cards on ophthalmic cases which are returned to thi theatre of war will be most gratefully appreciated.—I am, etc.

A.F.H.Q., C.M.F. B. W. RYCROFT, Lieut.-Col.; Adviser in Ophthalmolo

Civilian Respirator as Anaesthetic Mask

SIR,—We noted with interest Dr. F. S. Vaughan's adaptatio of the gas mask for inhalation anaesthesia (Jan. 27, p. 131) While we do not doubt that as a substitute for Clausen harness it is all that he claims, we should like to point ou that the dead space in the apparatus as illustrated is fa too large to permit of adequate CO_2 elimination.

The leakage which Dr. Vaughan advances as a potentia criticism of his device is, in our opinion, an essential i preventing the accumulation of CO_2.—We are, etc.,

F. G. ETHERIDGE.
Botleys Park, Chertsey. F. M. SANDFORD.

Nicotinamide Deficiency and Gingivitis

SIR,—I have just read with interest the article by Dr R. A. Coulson and P. Ellinger and Squad. Ldr. G. A. Sma on urinary elimination of nicotinamide methochloride in sub jects with healthy and diseased gums (Jan. 6, p. 6). My intere is accentuated by the fact that in the early summer of 19 I was asked to make the mouth examinations for the R.A investigation which was then being considered. Indeed, number of preliminary examinations were made according t plans formulated by Dr. Platt, Dr. Ellinger, Wing Cmdr. Macra and myself. A few comments may not, therefore, be out

place here regarding the authors' conclusion that "nicotinamide deficiency probably did not play any part in the development of gingivitis of any type among the subjects examined."

It is difficult, from this paper and from the previous one by Squad. Ldr. Smart, to know what method was used for recording and summarizing the clinical data. On one occasion I was present when Squad. Ldr. Smart was examining a group of R.A.F. subjects. The condition of the gum surrounding each tooth in the mouth or, in the absence of one or more teeth, the region where the teeth had been was recorded separately. How, then, was the amount of disease estimated per subject? And how were the subjects allotted to the various disease categories described? Was the condition of a mouth assessed as that of the region showing the most severe lesion of a given type, or was some other method adopted?

In the present paper the authors have shown that the amount of physical energy expended is one of the factors which affects the "F_2" content of the urine (Table V). In one of the articles to which they referred (but not in relation to this energy factor) it was stated (King, 1943) that physical exertion seemed to be associated with the onset and progress of ulcerative lesions of the gum. Incidentally, too, no mention is made of the report on acceleration of co-ordinated muscular effort (Frankau, 1943) by nicotinamide. Again, referring to Table V of the present paper, it appears that the higher "F_2" urinary contents occurred in those groups tested during the winter (March), when so-called trench mouth is much more prevalent, and the lower "F_2" values were found in the summer tests (May-June), when the ulcerative disease is relatively rare.

Has any consideration been given to the possible significance of these apparently coincidental observations? In the absence of further investigation, and in view of the admitted lack of knowledge of other factors which may influence urinary elimination of nicotinamide methochloride, are the authors justified in coming to the conclusion quoted earlier in this letter?—I am, etc.,

J. D. KING, Ph.D., L.D.S.

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Psychosomatic Factors in Disease

SIR,—I read with great interest Sir Walter Langdon-Brown's remarks (Jan. 13, p. 35) on the growing importance attached to psychosomatic aspects in modern medicine. Conditions as varied as migraine, angina pectoris, cardiac and bronchial asthma, gastric ulcer, cyclical vomiting, sterility, enuresis, urticaria, and many others are to-day clearly recognized as manifestations of physical, psychological, hereditary, and environmental factors. But in these days of acute shortage of medical men and women in hospitals and general practice it seems to me that the profession should proceed with great caution. As usual, the truth lies somewhere in the middle. It is just as dangerous to label as neurotic a patient with a real complaint as vice versa. And it should not be forgotten that some chronic conditions of slow and insidious onset—e.g., pulmonary tuberculosis and pernicious anaemia—may present with irritability and other neurotic symptoms long before any definite clinical signs can be elicited. A careful taking of the family history can be of great help in cases of this sort.

In conclusion I might suggest that we could alter the well-known Latin proverb to *Mens insana in corpore insano* as a timely reminder and warning.—I am, etc.,

Fazakerley Sanatorium, Liverpool. VICTOR LEITNER.

Psychology's Opportunity

SIR,—The letters of Dr. A. C. Wilson (Jan. 20, p. 96) and Dr. A. Tandy Cannon (Feb. 3, p. 163) give us an astonishingly optimistic forecast of a world led by psychologists. One is reminded of Auguste Comte's scientific high priests. Their letters, however, raise certain doubts in the mind of the reader. First, do the therapeutic results achieved by psychologists in actual clinical practice justify the expectation that, however ingenious they may be in describing the aetiological factors in disease, either of the individual or of the body politic, they will prove to be reliable guides in the difficult matter of directing whole communities?

Secondly, is it certain that the social results achieved in Russia *are* due to the guidance of psychologists? There were two very powerful forces shaping society in Russia. One was the fact that ever since the revolution the U.S.S.R. has been faced with the hostility of the world, and, "standing alone" as we did in 1940, neighbourliness was fostered among them, as it was among us at that time. A psychologist should not forget all the fantasy, the projection, and the identification which result from dividing the world into "we" and "they." The real test of the Russian experiment will come when Russia has had ten years of peace and prosperity. And, as international alignments may be quite different by then, it is just conceivable that our views about her aggressiveness may have undergone a subtle change. Another factor in shaping Russian society was the Utopianism which is native to the Russian character, but which finds no justification whatever in the prevailing psychological theory—behaviourism. For the behaviourist all motivation is *a tergo*; for the Utopian it is *a fronte*. You cannot have it both ways.

But apart from these forces there was a very good reason for falling into line with accepted social practice—a reason which had nothing to do with psychologists. We are all Russophile now, of course, and it seems rather ungrateful to recall that like-mindedness in Russia was considerably helped by the "liquidation" of those who were not like-minded. Do the advocates of emulation of Russia suggest similar methods of ensuring social solidarity and conformity in this country?

In the third place, may one ask which school of psychology is going to supply the guides to the new social order—Freudians, Jungians, Adlerians, or Watsonians? Some of these at least are mutually exclusive, even when they are not self-destructive. And, please, Dr. Cannon, is it really true that all psychologists have *ipso facto* no selfish motives?

Fourthly, is it really correct to say that all Western nations are labouring "under the yoke of an archaic ecclesiastical rule"? I should have thought that at no time in the history of the world, except perhaps in Greece in the fifth and fourth centuries B.C., has the Church had less influence on the thought and practice of the masses as at present. Most people pay far more attention to the quite unjustifiably pontifical utterances of scientists or the bletherings of astrologers than they do to the Church leaders. Perhaps that is what is wrong. Who knows?—I am, etc.,

Liverpool. F. B. JULIAN.

Prisoner-of-War Mentality

SIR,—Major P. H. Newman's letter (Feb. 3, p. 163) was of particular interest to me as I read the article quoted while still a P.O.W., and have since experienced the "release phenomena" which he describes.

One has to be very careful in passing comment on this subject in order to avoid the degree of one's "Stalag happiness" being assessed. I should, however, ask Major Newman to consider this question in the light of his experience in contact with: (*a*) psychoneurotics in static units at home; (*b*) repatriates from the West Coast of Africa, Palestine, Iraq, and India; (*c*) civilians outside the "blitzed" areas—i.e., three groups who have seen less action than the majority of P.O.W.s. I think with comparative numbers he will find that the P.O.W. mentality will show up very favourably.

The three enumerated symptoms are as applicable to these groups as they are to P.O.W.s, and surely there is more "lack of respect for authority, actively encouraged disrespect, and sabotage against authority" exhibited among civilian workers than by ex-P.O.W.s or other Servicemen. This is clearly seen by strikes, threats, wilful absenteeism, dictation to national leaders, and so on.

I should also like Major Newman to review the last eight months, and remember the days before D-day: the impatience expressed by everyone, the wave of optimism with the invasion, and the return of the impatience at the Caen delay. This was followed by more rapid progress with fantastic references to the short duration of the war so freely expressed by all except ex-P.O.W.s. Lastly, the attitude adopted by so many of our politicians, press agents, and general public over the Greek question. These are a few of the facts which give me the impression that there is too much fuss made over the mentality of P.O.W.s, and that, with few exceptions, they will not require

any more post-war rehabilitation than any other section of the community.

I thoroughly agree with the final paragraph. The "square deal," or lack of it, is, of course, the excuse given for all discontent throughout the country, and unfortunately many ex-P.O.W.s harbour a legitimate grouse.—I am, etc.,

C. DONALD,
Capt., R.A.M.C.

Sulphamerazine

SIR,—I was surprised to read in your leading article on sulphamerazine that this compound is not yet available in this country. It was first supplied to me early in December last, and in 5 cases of lobar pneumonia in which I have used it I have found its clinical effectiveness comparable with that of sulphapyridine. I have had no experience of sulphadiazine, but with sulphamerazine there has been a complete absence of nausea and vomiting and that feeling of malaise which I have found to be almost a constant feature with sulphapyridine and to a slightly lesser degree with sulphathiazole. This absence of toxic symptoms may have been partly due to the fact that I have split the initial dose of 3 g. into two doses of 1½ g., the second dose given 2 hours after the first. Thereafter I have given 1 g. every 8 hours, maintaining this dosage for 72 hours after the temperature and pulse rate had been normal for 24 hours. In this very limited number of cases the temperature has reached normal by the morning of the fourth day, and there has been no subsequent rise. The compound was supplied to me by Messrs. Sharpe and Dohme, Mulford Biological Laboratories, Hoddesdon, Herts. —I am, etc.,

Thrapston, Kettering. E. I. H. WHITE.

Artificial Insemination

SIR,—What are the advantages of artificial (donor) insemination? That the wife probably or possibly produces an offspring and develops a full maternal instinct towards her offspring.

What are the disadvantages? (*a*) The legal aspect, which has already been mentioned in several letters. (*b*) That the procedure requires the donor to masturbate. Although one may accept masturbation as a common occurrence and not the bogy which it was held to be by a previous generation, does the end justify asking a normal healthy man to masturbate, and is there not some risk of it having a psychological effect on the man and disturbing his relationship with his own wife?

The alternative to artificial (donor) insemination is adoption, and in my experience of work in a welfare centre there has been no less maternal instinct aroused in the mother with an adopted baby than in a mother with her own baby, and, in fact, because it has been a baby which has been wanted they have practically without exception been well-cared-for babies.

Approaching sterility from another point of view, is everything being done to prevent women from becoming sterile? Is it not likely, for example, that *x*-ray work over a certain period renders a woman sterile? Three cases are known to me where this has almost certainly been the case—two were radiologists and the third a sister in an *x*-ray department. Should this not be fully investigated, and, if necessary, legislation introduced, either not allowing women to do *x*-ray work without at least warning them of the possible consequences or, if it can be prevented by extra protection, making this compulsory?—I am, etc.,

Dorking, Surrey. MARY C. JEFFRIES.

SIR,—The emotional reaction of most of your correspondents to this subject is rather alarming. In particular, I am amazed at the outlook of Dr. F. M. R. Walshe, who in the past has advocated a medical curriculum designed to attempt to lead the student to think *clearly*. Apparently he would have the student reserve one most important aspect of life—everything pertaining to sex—for emotional consideration only.

Surely, if any body of opinion might be expected to face the physiological-sociological problems of a world intent on permanent peace it is that of the medical profession. Our aim should be to aid the establishment of stable, healthy populations in all the countries of the world, and to this end the possible use of artificial insemination no less than that of birth control should be judged not on grounds of narrow-minded puritanism or bigoted catholicism, or as affecting a patriarchal property-owning society, but with a view to the greater security and happiness of the ordinary man.—I am, etc.,

London, W.1. M. GRACE EGGLETON.

SIR,—Whatever may be one's personal views on the above subject, it is right and proper that the opinions of the profession should be ventilated as widely as possible in the columns of the *Journal*. That the opinions are diverse is evident, and those who support the operation do so largely for two reasons: (1) to satisfy the parental longings of the childless but otherwise happily married couple; and (2) to increase the number of children born, and thereby rescue the nation from steady progressive extinction in the role of world man-power.

I agree with Dr. Leonard G. Parsons (Jan. 20, p. 96) that the first of these is adequately provided for in the adoption of children. This has the advantage that the child can be selected by husband and wife after searching inquiry on the part of the Adoption Society, and that the existence of congenital disease or inherent weakness in the child can be almost completely eliminated by competent examination of the child and evidence of the sound health of its parents. Dr. C. O. Carter (Jan. 27, p. 130) urges the advisability of artificial insemination in cases where "a woman is unable to find a husband"—surplus of women over men of reproductive age after the war. This, it is presumed, includes all spinsters and widows of reproductive age. Does Dr. Carter believe that legalized artificial insemination for this purpose would be followed by the picture of queues of eligible spinsters and young widows at the consulting-rooms of obstetricians and gynaecologists? Surely not! Rather than pretend that artificial insemination is the answer to this problem, would it not be at least as ethical to legalize polygamy for the virile husband and sterile wife, and abolish the Seventh Commandment in favour of the woman so unfortunately mated to an impotent husband?

Why has the profession not the considered opinion and guidance of the Royal College of Obstetricians and Gynaecologists, and why the silence of the Christian Church? None the less important in influencing the practice of this revolutionary operation would be the views of the Law Lords on its legality.

The whole idea must be so repellent to the average individual that to its advocates the great mass may exclaim in amazement, "What sort of people do they think we are?"—I am, etc.,

London, S.W.1. A. S. HANNAY.

SIR,—Having read some letters in your *Journal* on this subject with disgust, I was more than pleased to read those of Dr. Leonard Parsons (Jan. 20, p. 96) and Dr. F. M. R. Walshe and others (Feb. 3, p. 165). It is to be hoped that those who advocate this practice will consider whether or not they are accessories before the act to pseudo-adulterous practices, and that these result in illegitimate babies for all time. This practice, with its results, cannot be defended on religious, moral, or even eugenic grounds. It may well be that the General Medical Council will come to regard this as "unprofessional conduct," and it would be well if it did.—I am, etc.,

London, W.1. C. GORDON-WATSON.

SIR,—Your recent correspondents have shown much indignation against the practice of human artificial insemination. The legal position, the Christian ethic, the social consequences and even natural delicacy have all been invoked as strong reasons against that practice. Without challenging the legal argument or entering into a discussion of the social precedent involved, I think it would be fair to suggest that your correspondents have, in the full flush of their righteousness, somewhat lost their sense of proportion. Facts need re-emphasis. Artificial insemination is proposed only for that comparatively small but very unfortunate minority of couples who are sterile due to some fault in the husband's sperm or to incompatibility between otherwise normal gametes, and who also ardently desire a fruitful marriage. Lurid pictures of vast stud farms and the imaginary scenes within are the product of a prurient rather than a reasonable mind.

Those who cry for a greater awareness of Christian principle should remember that human compassion is a Christia

precept, perhaps the greatest of them, and there is almost no tragedy so great as that of a childless marriage between those who love children. Our compassion, not our indignation, should be aroused by these people who want children at least half-kin to themselves. Further, it should be remembered that in olden times, and still in many of the great agricultural areas of Europe, the hollow mockery of a childless marriage is avoided by society's tacit sanction of pregnancy before marriage. Modern civilization would not tolerate that; no more will it tolerate marriage at a reasonably early age; it is in fact so far from Nature in its social laws that human attempts at compensation are inevitable. The doctor's attitude in the face of this conflict is indeed difficult, but surely a pharisaical attitude should be avoided. As in the case of many other medical ethical problems the best plan is to avoid pronouncements, but to keep one's own counsel and a clear conscience.—I am, etc.,

"SERVICE DOCTOR."

Deaf Aids

SIR,—I have during the past ten or so years had some experience of the various types of deaf aids in an attempt to find suitable apparatus for the individual use of deaf children for educational work, and for various adults who have enlisted my help in the matter. I can only conclude that the circumstances of wartime plus a patch of bad luck are the reasons for the excessive maintenance costs of Mrs. Barlow's various deaf aids (Jan. 27, p. 130), as I can find no one among my acquaintance who has had anything like the amount of trouble, when using pre-war apparatus, now from six to nine or more years old. The quality of accumulators and batteries has undeniably gone down, as some of the essential ingredients are in short supply, but the failures of valves can only be put down to faulty inspection or constructional weaknesses, which are the responsibility of the valve-making firm and not of the makers or assemblers of deaf aids.

The greatest trouble with the deaf aid of any type is the perennial attempt to get a quart into a pint pot, so as to render the apparatus as small and compact as possible. Thus the sizes of components are reduced to the minimum, and so the margin of material strength and insulation, etc., is reduced beyond that required for real durability and longevity. In the specific cases of the H.T. battery and L.T. accumulator, the reduction in size and weight inevitably means a reduction in metal and chemicals needed to produce or store electrical energy, so that a good current capacity is impossible. The relationship between life and weight is roughly a geometrical progression, so that the tiny batteries in use are obviously not meant to last more than a short time in constant activity.

The need to return apparatus to London for repair is also apparently a wartime necessity, for in peacetime most of the reputable dealers had provincial depots to relieve the user of the delays so far as possible. It is, however, possible that the makers wish to handle their own apparatus, not merely from the business point of view, but in order to secure that the repairs are done properly for the sake of the repute of their products. In post-war days when radio servicing returns to its previous high level, there will be ample facilities in every town of any size for the instant repair of any dead aid, provided that the parts needed are such as are reasonably standard in the trade. There is no difference between the inside of a deaf aid and the low-frequency end of a wireless set, and it can as easily be tested and repaired.

The other points mentioned by Mrs. Barlow may be briefly answered thus: (1) A standard or utility deaf-aid set, battery only, can be built now at home by anyone used to simple tools, on the basis of the design by Dr. Littler, published some time ago in the *Wireless World*, with lists of parts and full instructions. (2) Directions for the conversion of an all-electric "midget" receiver into a good-quality deaf aid were given in an American periodical early in the present war, and the job is fairly straightforward. (3) The directions for the making up of a miniature three-valve pocketable deaf aid are available from U.S. sources, and if any doctor would like a copy I can supply one if given the necessary time for reproduction. (I have recently supplied one gratis to an assistant M.O.H.) (4) A good all-mains deaf aid can be adapted from a mains amplifier by the incorporation of a crystal microphone and suitable ear-piece, or the use of the gramophone amplified end of a modern wireless set, using the extra loudspeaker wiring to carry the ear-piece wiring, subject to the usual safety precautions for electricity.

Economy can be made in running costs in the following ways, all of which have been practically tested over a period of years.

Non-valve Aids.—Use that battery which is heaviest, for it gives longest service, and use three or four in series to recuperate. Switch off the current whenever the aid is out of use, for the current "pits" the granules or balls of carbon in the usual microphone, necessitating replacements. Treat the connecting cords very carefully, keeping them away from perspiration so far as possible, and remember that a kink in the cord may be a break later. If batteries are expensive or hard to get, secure some U.2 size cells and make a small container to take the required number in series to make 3, 4½, or 6 volts' supply.

Valve Aids.—If the aid is to be used at any time in a stationary position for hours at a time, it is a great economy to use a heavy-duty high-tension battery of 120 volts and a large 2-volt accumulator, external to the aid by means of short wires and clips. The first 60 volts are used one day and the second 60 the next day and so on. Six to nine months' use can be expected from a good battery, and a box can be designed as a base for the deaf aid to stand on and contain the batteries when so used. Finally the use of a hydrometer and a trickle charger with two accumulators, kept properly charged and used in turn, will extend the life of the usual small accumulator by a considerable amount.—I am, etc.,

EDWARD T. JORDAN,
Honours Diploma, College of Teachers of the Deaf.
935, Great Cambridge Road, Enfield.

The Younger Men

SIR,—Mr. A. Basil Rooke's letter (Jan. 20, p. 97) calls for comment on several grounds. My letter did not refer to E.M.S. officers but to A.M.O.s of permanent institutions, nor did it refer only to younger men. We are not asking for amenities but for an opportunity to live normal lives despite the fact that we have taken up hospital work. Many of us, working in hospitals where there is a gross shortage of medical and nursing staff, have not been able to "continue our studies." The authorities, however willing, have been unable to give us facilities. In many cases serving officers have had varied experience which will be invaluable not only in practice but in obtaining higher diplomas.

He fails, apparently, to realize that if the advances urged in my letter are made, serving officers who come into hospital practice will benefit thereby. It is not unknown for an A.M.O., who has married while on service, to be threatened with the loss of his reinstatement rights. Many of the younger men on service, who will wish to study further, are already married and deserve "at least as good a chance as their contemporaries" of continuing (beginning might be more accurate) a normal married life. In the majority of hospitals this is an utter impossibility. I would refer him to the *Journal* of Nov. 4 (p. 610) for a medical superintendent's views on this.

His unfortunate references to "those who enlisted" and "those who obtained further deferment" are to be deprecated. Apart from those rejected by the Services on medical grounds, there are many who have made repeated attempts to volunteer and who have been refused permission to leave their posts or whose call-up has been successfully opposed by the Departments controlling their hospitals. With the probable increase in resident posts after the war there should be room for all who have served loyally at home or over-seas—in uniform or out. Nothing has been written which invalidates the arguments for, or lessens the urgency of, providing proper quarters for A.M.O.s. "Both the future of medicine and eugenic considerations" urge "the need for such a step."—I am, etc.,

"B1."

Neurone, Mind, and Crime

SIR,—Without here discussing other controversial points raised in your annotation on Prof. R. J. A. Berry's address (Feb. 3, p. 157) I should like to suggest that his observations on the brains and skulls of criminals be accepted with considerable reserve. In his original article Prof. Berry states that, with regard to the size and weight of the brain, "50% of the habitual criminal classes approximate more nearly to mentally defective levels than to the normal—that is, they have underdeveloped supragranular brains of control." Further, with regard to skull capacities, he states that these are largest in "university teachers," "followed on a downward scale by such different mental types as . . . criminals, 20-year-old reformatory boys, 13-year-old mentally defective boys," etc.

Since the days of Lombroso a vast amount of scientific evidence has been accumulated tending to disprove the validity of alleged physical anthropological characteristics by which the so-called "criminal" and the "reformatory boy" could be differentiated as specific types from the "rest" of the population. Prof. Berry's findings, based on statistical studies of isolated groups of so-called "criminals," should therefore be considered extremely critically, particularly with regard to

such points as selection of cases and "controls," their intelligence, physical history, etc. C. Goring, as early as 1913, wrote: "There is no such thing as a physical criminal type"; and many other authorities, including the eminent anthropologist Hrdlicka, are in complete agreement with this statement.

Although it would no doubt be a conveniently simple explanation of criminality to regard it, with Prof. Berry, as being due to an underdeveloped supragranular cortical level and, therefore, to uninhibited infragranular activity, there is as yet insufficient evidence to justify this conclusion. Indeed, recent research in psychopathology has shown how near to overt criminal activity we all may be—"university teachers" no less than the feeble-minded, and probably more so, for intelligence, however misdirected, is often necessary to commit a crime. Criminal psychopathology in particular, as represented by the work of Healy, Alexander, Aichhorn, Karpman, and others, has stressed the importance of a study of the *individual*, rather than that of statistical generalities, in the understanding of the aetiology of crime, and has gone far to show how heuristically meaningless can be the study of an average or composite picture of "the criminal." One might go so far as to say that "there is no such animal."—I am, etc.,

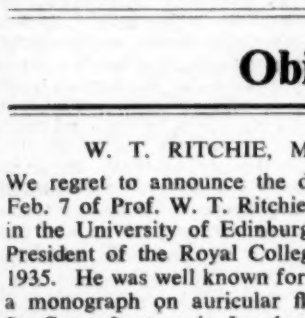
Warlingham Park Hospital, Surrey. R. H. AHRENFELDT.

Obituary

W. T. RITCHIE, M.D., LL.D., F.R.C.P.ED.

We regret to announce the death at Colinton, Edinburgh, on Feb. 7 of Prof. W. T. Ritchie, who held the chair of medicine in the University of Edinburgh for ten years, and was elected President of the Royal College of Physicians of Edinburgh in 1935. He was well known for his work in cardiology, published a monograph on auricular flutter in 1914, and delivered the St. Cyres Lecture in London in 1939; his book on *Diseases of the Heart*, written jointly with Dr. John Cowan, of Glasgow, reached a third edition.

William Thomas Ritchie, son of R. B. Ritchie, was born on Nov. 3, 1873, and studied medicine at the University of Edinburgh, taking the degrees of M.B., C.M. in 1896, and the M.D. in 1899, and was elected F.R.C.P.Ed. in 1903. After graduation he studied in Vienna clinics, and returning to Edinburgh practised there for over 40 years. He became physician, and later consulting physician, to the Royal Infirmary and to the Deaconess Hospital, and physician consultant to the Edinburgh municipal hospitals. During the last war he was at first medical officer to the 1/3 Scottish Horse and later in charge of the medical division of No. 27 General Hospital in Egypt. His war services were recognized by mention in dispatches and the award of the O.B.E. In the present war he acted as physician at the Emergency Medical Service Hospital at Bangour, and he had been honorary consultant in cardiovascular cases for the Ministry of Pensions.



[Photo by Young, Edinburgh

When W. T. Ritchie succeeded Prof. Lovell Gulland in the chair of medicine at Edinburgh in 1928 he took a large part in remodelling the arrangements for teaching in the Faculty of Medicine by co-ordination of the courses given by the professors of pathology, materia medica, medicine, and surgery. He was a Fellow of the Association of Physicians of Great Britain and Ireland and of the Royal Society of Edinburgh, and gave the Gibson Memorial Lectures in 1923. His services as an examiner in medicine were called upon by the Universities of St. Andrews, Aberdeen, and Durham. In the British Medical Association he held office as secretary of the Section of Medicine at Newcastle in 1921 and as vice-president during the Edinburgh Annual Meeting of 1927. Last year he received from his own university the honorary degree of LL.D. Besides his writings on diseases of the heart Prof. Ritchie was joint author with Dr. J. J. Graham Brown of a book on *Medical Diagnosis*, which passed into a fifth edition and was deservedly popular as a handbook of clinical methods for practitioners and students.

KATHLEEN KITCHIN, M.B., M.Sc.

We announce with much regret the death after a short illness of Dr. Kathleen Kitchin on Feb. 5 at Aldbourne, Wiltshire. For some years she took an active part in B.M.A. work as representative of her Division, and her literary gift found an outlet in the service of medical and legal journals and as author of many papers and books.

Mary Kathleen Forsaith Lander was born at Bournemouth on May 21, 1897, and from Wimbledon High School went to study for our profession at the London School of Medicine for Women and St. Mary's Hospital. Before qualifying M.B. B.S.Lond. in 1921 she had been demonstrator of anatomy at the London School of Medicine for Women and honorary acting prosector for the Zoological Society. She was the first woman to take the B.Sc.Lond. degree in human anatomy and morphology, following it in 1919 with the M.Sc. She was awarded a Beit Fellowship in 1921, but had to resign it on account of ill-health. After acting as assistant curator of the Wellcome Historical Medical Museum she had five years in general practice in London, including infant welfare and ante-natal clinics. She was a member of the Representative Body of the B.M.A. from 1923 to 1928 and vice-chairman of the St. Pancras Division in 1926. She began psychological study in 1923, working with Jung in Zurich, and was on the staff of the Tavistock Clinic for some time, working also at the Bethlem and the Maudsley Hospitals. In 1925 Dr. Lander married Mr. D. Harcourt Kitchin, barrister-at-law and frequent contributor to these columns, and she herself was called to the Bar in 1936. Together and separately they did a great deal of legal and medical journalism, and translated and edited a number of books for medical authors.

During the last few years Dr. Kathleen Kitchin worked chiefly as a psychologist, and took special interest in the Guild of Pastoral Therapy. Her enterprise and thoroughness in varied directions did not seem to exhaust the fund of native energy or the zest for life, and her passing at the age of 47 leaves a gap in a wide circle of friends and colleagues.

CECIL A. JOLL, F.R.C.S.

Surg. Rear-Adml. G. GORDON-TAYLOR writes: Perhaps a brief space may be permitted to one who, though not a hospital colleague of Cecil Joll, greatly admired his surgery and his courage. Reference has already been made to his colossal industry and energy, but no one has affirmed the truth that no other operating surgeon within our British Isles can have completed so vast a number of major surgical operations in a lifetime of scarcely 60 years.

Joll drove the chariot of his professional life with incredible speed with ceaseless wheels, and without rein or bridle. The obituary notice in your columns has remarked on the astronomic number of hospitals to which he was attached and the legendary list of operations performed at each séance; and Joll's attachment to a hospital was not a mere nominal affixation but involved a whole-hearted participation in the surgical work of the institution. His surgical life was one of deeds rather than words, and it is as a consummate surgical artist that he himself would have desired to be remembered. There are a few operating theatres in London to which a surgical visit becomes an inevitability; in Joll's theatre there was an assurance of a goodly surgical company—not the surgical wanderer on a busman's holiday, but busy surgeons anxious to improve their own art.

The fortitude and courage wherewith he continued his operative work under a sentence of death until a fortnight of his demise commanded the respect and admiration of all; the carefully corrected and signed letter the day before his death recalls the story of the Venerable Bede, and the words used by the great Marquis of Montrose three hundred years ago keep recurring to one's lips: "I am resolved to carry on with honour and fidelity to the grave."

He was not the only member of our profession to interest himself in ornithology, and on the few occasions when he tore himself away from his ceaseless surgical life he would transport himself to some bird sanctuary or island off the shore, where he could observe his avian friends. It seemed not unfitting that a great concourse of

birds which the duress of the weather had driven inland and which gathered in flocks in the neighbourhood of his domicile should be present at the passing of one who had loved them so devotedly in the noontide of his eager, ardent life.

Mr. ROBERT V. COOKE, CH.M., F.R.C.S., writes:

For many of us in the Provinces the untimely death of this great surgeon is a cruel blow. We have with so much profit spent wonderful afternoons with him, even though we may have been humbled by the experience. We shall always feel very much gratitude for surgical instruction and inspiration, and some of us for much personal kindliness and hospitality, so that there is a special poignancy attached to his passing. These remarks would be reiterated by vast numbers of surgeons from other countries—and particularly by our American colleagues. (I shall never forget the eulogies of both Mr. Willie and Mr. Charlie Mayo.) Joll would discourse so well to a crowd of visiting surgeons, though operating all the time at incredible speed with such enviable precision and accuracy. One must speak of his team work, particularly as it was seen on those Monday afternoons at the Royal Free Hospital. The fineness of his work, his drive and tirelessness, were only matched by the loyal, unsparing energies of the anaesthetists and his many assistants—by no means forgetting the sisters and nurses in the theatres and in the wards. He was always ready to give generous praise to those who had contributed to his success. Others have tried to emphasize his phenomenal capacity for sustained work of the highest order which must undoubtedly become legendary. He was truly a magnificent surgeon. In our ranks few, if any, can have accomplished so much so well.

We regret to announce the death on Jan. 16 in a nursing home, after a short illness, of Dr. R. W. H. MEREDITH, formerly of Wellington, Somerset, aged 70. He studied medicine at the Middlesex Hospital, and after qualifying M.R.C.S., L.R.C.P. in 1900 was house-surgeon to the Seamen's Hospital, Greenwich. During the last war he served as captain, R.A.M.C., with the 121st Indian Combined Field Ambulance, B.E.F. Dr. Meredith was for many years medical officer to Wellington School and surgeon to the local cottage hospital. He joined the B.M.A. in 1906 and held office as president of the West Somerset Branch in 1919–20. Latterly he had lived in retirement at Bournemouth.

Dr. THOMAS ROWLAND CHARLES WHIPHAM, who died at Exeter on Jan. 20, was the son of Thomas T. Whipham, M.D., and was born in London on Jan. 4, 1871. He was educated at Rugby School and New College, Oxford, and at St. George's Hospital, where his father was physician. He graduated M.B., B.Ch.Oxon in 1898, took the M.R.C.P. in 1900, and proceeded M.A. and M.D. in 1905. At St. George's he served as demonstrator in materia medica, assistant curator of the museum, and medical registrar; later he became physician to the Evelina Hospital for Children, and assistant physician and physician-in-charge of the children's department of the Prince of Wales's Hospital, Tottenham. In 1918 he gave up work in London and went to South Devon, where, though nominally in retirement, he acted as assistant physician to the Royal Devon and Exeter Hospital, and consulting physician to the Exeter Dispensary and the Children's Convalescent Home at Exmouth. His manual on *Medical Diseases of Children* was published in 1912, and about that time he wrote a number of papers which appeared in this and other journals.

The death of LEONARD WEST of Hoddesdon, Herts, at the age of 65, on Jan. 27 has taken away a notable medical landmark from East Herts. Born at Leeds, he was educated at Carglefield, Fettes, and Edinburgh University, where he graduated in 1903. He came to Hoddesdon in 1907, first as assistant and later for many years as head of a large town and country practice, where he was widely known and greatly liked. He held a number of appointments—as medical officer to the police, railway, and post office—and for over 20 years was honorary physician to the Hertford County Hospital. Later, he was made a J.P. and also a local councillor. He was also chairman or president of practically every club or association in the district. In all branches of work he showed the same buoyant energy, wise counsel, and ready understanding. He was a big man with a big heart, and will long be affectionately remembered by his many patients and friends—the terms are synonymous—for the outstanding feature of his life's work was his deep humanity. He had indeed a real flair for friendship. With old and young, rich and poor, he was always the personal friend as well as the doctor. His carefulness combined with his geniality and sense of humour, the twinkle in his eye, the jolly laugh, all inspired confidence, hope, and a feeling of security, and made him a welcome visitor to every house. As a physician he belonged perhaps to the older school of practitioners, who never forgot the patient in the case, and who placed clinical examination and diagnosis first, with laboratory methods an essential and invaluable adjunct. In midwifery his long experience had made him a first-rate accoucheur, and many families of two generations are indebted to him for his skilful and patient help. During the 1914–18 war he served as captain, R.A.M.C., in Egypt, Palestine, and Gallipoli; in this war he was head of the local first-aid post, which owed so much to him in its foundation and development, as well as to the enthusiastic support he aroused in those under him. In spite of his manifold activities he was a modest man, rarely spoke in public, and never advertised. He may not be remembered for original research work or surgical technique, but he will be long cherished in the hearts of all those who knew him for his strong and persuasive personality. In private life he was a splendid companion, and was always the life and soul of any gathering. He took a keen and active interest in all forms of outdoor pursuits: in his early days a famous rugger forward (he played for Scotland for three years, and was captain in 1906), a good shot and fisherman, and a good gardener (especially in rock plants). Indeed all sports appealed to him, though in later years recurrent illnesses limited these activities, but his interests were maintained, and he never complained. He lived greatly, he died bravely. Our deep sympathy goes to his wife, daughter, and two sons, both serving now in India.—L. R. L.

Dr. EDWARD STANLEY ROBINSON, who died at Stourport-on-Severn on Feb. 2, aged 79, was born at Leicester, son of George and Sarah Robinson. On the death of his father the small family removed to Stourport and lived for many years in Lombard Street in what is now the Workman's Club, and from there he went to the London Hospital, qualifying M.R.C.S., L.R.C.P. in 1888. For some years he voyaged round the world before settling down to what was to be his life's work—a family doctor—until his retirement in 1939. He joined the B.M.A. in 1899 and had been president of the Midland Branch of the Society of Medical Officers of Health. A correspondent writes: Dr. Robinson's was a long life and a full life. It was, above all, an unselfish life, and, as he always averred, a happy one. It was sufficient that he could serve his fellow men, and his reward was abundant in the boundless trust and affection given him not only by his patients but by all those among whom his lot was cast.

Dr. THOMAS TORRENS MCKENDRY died on Feb. 3 at the age of 82 after an illness lasting seven years. Born at Clough, County Antrim, he was educated at Coleraine Academy, Ballymena; at Queen's College, Cork, where he took his B.A. in science; and at Queen's College, Belfast, where he studied medicine, graduating M.B., B.Ch., and B.A.O. in 1894. Having worked as an assistant in Dulwich and Ilford he had his own practice in Goodmayes for some 19 years. At the end of 1918 he suffered a breakdown in health and relinquished his practice, but until 1927 he helped several of his medical friends in Buckinghamshire during the summer periods. Dr. McKendry was an ardent devotee of all kinds of outdoor sport, and performed many charitable acts in an unassuming way; one of his last gifts was £500 to the Old Boys' Association of Coleraine Academy for the prize fund.

Dr. JOHN ROBERT WALKER died at Hove on Feb. 3 in his 100th year. The son of a doctor, he went from Kensington School to Epsom College as its first pupil. He studied medicine at St. Mary's Hospital, and after qualifying in 1868 served as house-surgeon and resident obstetrical officer there; his next appointment was as resident surgeon at Jarrow Infirmary. After that he took up practice in North-West London and was honorary surgeon to St. Peter's Home, Kilburn, and to the N.W. Division of the Metropolitan Police. Dr. Walker was the oldest Red Cross surgeon, and recently had a letter of congratulation from H.R.H. the Duke of Gloucester. The French Sisters of Mercy presented him with a Bible after the siege of Metz for his devotion to the wounded, and he held the German medal of the war of 1870–1. He joined the B.M.A. in 1873 and remained a member until his final retirement from practice. Dr. Walker's hopeful outlook on life helped him to maintain good health and reach his great age. He was a keen sportsman and noted for his love of Nature. He will be much missed by all who knew him.

Mr. A. R. Jordan writes: With great regret I read in your issue of Jan. 27 the obituary notice of Mr. FERRIER WALTERS of Bristol. The statement that in 1916 he was in charge of the abdominal centre at Aveluy is not correct. His centre was at Warloy-Baillon, behind Albert, where I had the pleasure of being one of the surgeons under him. We published the then largest series of abdominal wound cases, and here Walters had the honour of taking King George V round his hospital.

The Services

The Institute of Aeronautical Sciences of the United States has presented to Air Marshal Sir Harold Whittingham, Director-General of the R.A.F. Medical Services, its John Jeffries award for 1944.

Temp. Surg. Lieut. G. J. Potts, R.N.V.R., has been mentioned in dispatches for gallantry, determination, and devotion to duty in the assault on and capture of the island of Walcheren.

Lieut. K. C. Stephenson, R.A.M.C., and Jamadar R. D. Chowdhury, I.A.M.C., have been awarded the M.C. in recognition of gallant and distinguished services in Italy.

Capt. J. R. O. Thompson, R.A.M.C., has been posthumously awarded the George Cross in recognition of most conspicuous gallantry in carrying out hazardous work. The citation reads:

The award is for conspicuous gallantry and devotion to duty on board hospital ships since the start of the war, notably on the *Paris* at Dunkirk in May, 1940, and on the *St. David* at Sicily, Salerno, and at Anzio, when in each instance, in spite of repeated dive-bombing attacks and enemy shell-fire, he showed indifference to danger and physical exhaustion in the care of his patients. At Anzio on the night of Jan. 24, 1944, when the *St. David* was sinking rapidly as the result of a direct bomb-hit, he organized parties to carry the seriously wounded to safety in the boats and was thus instrumental in saving many lives. When the ship was obviously about to founder and all were ordered to save themselves, he returned alone in a last effort to save the one remaining helpless patient still lying trapped below. It is presumed that Capt. Thompson went down with the ship.

The *London Gazette* has announced the following appointments, awards, and mentions in recognition of gallant and distinguished services in North-West Europe:

C.B.E. (Military Division).—Brigs. (Temp.) H. L. G. Hughes, D.S.O., M.C., R.A.M.C., Reserve of Officers, A. E. Porritt, O.B.E., and Q. V. B. Wallace, O.B.E., M.C., R.A.M.C.

O.B.E. (Military Division).—Cols. (Temp.) R. D. Cameron, M.C., and K. A. MacD. Tomory, R.A.M.C., and C. Helm, D.S.O., M.C., R.A.M.C., Reserve of Officers; Majors (Temp. Lieut.-Cols.) E. Catford, W. M. Evans, M.C., L. R. H. Keatinge, S. C. H. Lane, A. MacLennan, P. R. Mitchell, and I am M. Paton, R.A.M.C., Col. B. C. Leech, and Lieut.-Col. (Acting Col.) C. D. Gossage, R.C.A.M.C.

M.B.E. (Military Division).—Major (Temp. Lieut.-Col.) W. S. Harvey; Capts. (Temp. Majors) F. J. S. Bowman, N. R. Butcher, F. O'K. Craven, H. Kennedy, R. L. MacPherson, and H. K. Meller; Capt. F. R. B. H. Kennedy, R.A.M.C.; Majors J. G. Jose, J. C. Luke, and R. A. Mustard, R.C.A.M.C.

D.S.O.—Major (Temp. Lieut.-Col.) A. McC. Campbell, R.A.M.C.

Bar to the M.C.—Capt. F. W. Hayter, M.C., R.C.A.M.C.

M.C.—Capts. P. W. Henderson, J. Johnston, and J. M. Murphy, R.A.M.C. Capts. H. L. Handford and W. S. Huckvale, R.C.A.M.C.

Mentioned in Dispatches.—Col. (Temp.) C. E. Eccles, O.B.E., and Major (Temp. Lieut.-Col.) C. D. Evans, O.B.E., R.A.M.C.

The *London Gazette* has announced the following appointments, awards, and mentions in recognition of gallant and distinguished services in Italy:

O.B.E. (Military Division).—Col. C. S. Thompson; Lieut.-Cols. J. P. Laplante and J. A. Noble, R.C.A.M.C.

M.B.E. (Military Division).—Majors J. L. M. Anderson, A. M. Doyle, and P. A. Scott, R.C.A.M.C.

D.S.O.—Col. H. M. Elder, R.C.A.M.C.

Mentioned in Dispatches.—Col. G. A. Sinclair, Lieut.-Col. J. H. Palmer, Majors G. M. Bastedo, J. K. Bell, J. A. Bradshaw, D. R. E. MacLeod, E. A. MacNaughton, P. J. Maloney, J. A. Melanson, E. Quehl, L. J. Quinn, J. G. Shannon, F. L. Shipp, P. M. Spence, A. R. Tanner, and P. K. Tisdale, Capts. G. C. Bowes, J. A. Gow and T. Statten, R.C.A.M.C.

The *London Gazette* has announced the following appointments and awards in recognition of gallant and distinguished services in Burma and on the Eastern Frontier of India:

O.B.E. (Military Division).—Cols. (Temp.) R. A. Anderson and W. J. Officer; Majors (Temp. Lieut.-Cols.) J. A. Baty, J. G. M. A. Brunet, A. D. Davidson, M. H. P. Sayers; Capt. (Temp. Major) A. E. Jowett, R.A.M.C.

M.B.E. (Military Division).—Capts. H. M. Jamison and K. McCaul, R.A.M.C.; Capt. L. N. B. Raja and Subadars D. Mohd and L. Ram, I.A.M.C.

M.C.—Capt. (Temp. Major) (Acting Lieut.-Col.) A. Burns, and Capts. J. W. R. Battram and D. Mitchell, R.A.M.C.; Capt. (Temp. Major) U. S. Sidhu, Capts. K. C. D. Gupta and P. C. Sarkar, Lieut. (Acting Capt.) B. G. Kiddle, and Subadar S. Singh, I.A.M.C.

CASUALTIES IN THE MEDICAL SERVICES

Killed in action in Burma.—Capt. John Ravenhill Sweeting, R.A.M.C.

Killed as the result of an accident, while on active service.—War Subs. Capt. Gerald Arthur Richards, R.A.M.C.

Wounded.—War Subs. Capt. S. D. Stock, O.B.E., R.A.M.C.

Universities and Colleges

UNIVERSITY OF OXFORD

In Congregation on Feb. 6 the University accepted gratefully from the Rockefeller Foundation £1,200 for biochemical investigations of penicillin during the year beginning March 1, under the direction of the professor of pathology, Sir Howard Florey.

In a Congregation held on Jan. 25 the following medical degrees were conferred:

D.M.—*W. A. Young.

B.M., B.Ch.—N. D. Ashe, M. J. T. Hewetson, *A. G. Beckett, *M. R. Williams, *J. T. Wright, *B. A. Ellenberg.

* In absence.

UNIVERSITY OF LONDON

The following have been recognized as teachers of the University in the subjects indicated in parenthesis: *Lister Institute of Preventive Medicine:* Dr. A. N. Drury, F.R.S. (Pathology). *University College:* Dr. R. A. Gregory (Physiology); Dr. H. O. Schild (Pharmacology). *St. Thomas's Hospital Medical School:* Dr. C. C. N. Vass (Physiology). *St. George's Hospital Medical School:* Mr. J. R. Peacock, F.R.C.S. (Oto-rhino-laryngology). *London Hospital Medical College:* Mr. R. W. Watson-Jones, F.R.C.S. (Orthopaedics); Dr. H. L. Wilson, F.R.C.P. (Mental Diseases). *Royal Veterinary College:* Dr. E. C. Amoroso (Histology and Embryology).

In and after 1945 the first examination for medical degrees held in December will be normally open only to the following: (1) Candidates who have been "referred" in one subject at a previous examination. (2) Candidates exempted from one or two subjects of the examination. (3) Candidates who produce a medical certificate that they were prevented by ill-health from sitting for the examination in the previous July.

UNIVERSITY OF MANCHESTER

Brian Schofield, M.B., B.Chir., has been appointed demonstrator in human physiology, and N. J. Caldwell, L.M.S.S.A., demonstrator in pathology.

UNIVERSITY OF SHEFFIELD

The Council of the University has accepted, with great regret, the resignation of Mr. George Wilkinson, M.B., F.R.C.S., of his post of Lecturer in the History of Medicine, and has thanked him for his valuable services to the University and its forerunners over a period of 51 years.

The Council has made the following appointments: Honorary Lecturer in the History of Medicine, Prof. E. F. Finch, M.D., F.R.C.S.; Temporary Demonstrator in Anatomy, W. J. W. Sharrard, M.B., Ch.B.; Honorary Lecturer in Psychology in the Faculty of Medicine, J. Carson, M.B., Ch.B.; Tutor for Diseases of Children, C. H. Rosenberg, M.B., Ch.B.

QUEEN'S UNIVERSITY, BELFAST

The following candidates have been approved at the examination indicated:

M.B., B.Ch., B.A.O.—*H. F. W. Fry, †J. H. Bruce, †T. T. Pulton, †W. McG. Lowry, †W. H. McDaniel, †J. K. Morrison, †M. W. Wilkin, J. T. Boyd, H. E. Busby, M. Byrne, R. S. Casement, W. F. Colburn, Sheelah B. Cosgrove, F. C. McC. Coyne, Eileen M. Craven, T. H. G. Dick, W. J. Elwood, T. P. Fearis, D. T. Gilchrist, C. J. Gilligan, W. A. Gilmore, G. T. C. Hamilton, F. E. Henderson, F. D. Honneyman, J. C. S. Houston, J. K. Hunter, Lucy M. Hunter, D. B. Kenny, Sophia E. Kernohan, Kathleen M. King, A. Kirkpatrick, Mary A. H. Lawson, Patricia M. Leitch, C. G. Lowry, H. D. C. McCaldin, S. G. McComb, J. A. McHugh, O. K. B. Moreland, Claire E. Morris, B. Mullally, R. A. Nelly, W. J. Patterson, T. W. Roddie, Gladys G. Seymour, M. McK. Shaw, J. T. Shepherd, Elizabeth Sherrard, Jessie H. Sloan, B. T. Smyth, J. Stewart, D. H. Tweedie, A. L. Wells, Mary Williams, P. J. K. Wilson, R. D. Wright.

* With first-class honours. † With second-class honours.

ROYAL COLLEGE OF SURGEONS OF ENGLAND

Professional lectures on applied physiology, by Prof. John Beattie, at 2.30 p.m., and on anatomy, by Prof. A. J. E. Cave, at 4 p.m., will be delivered at the College, Lincoln's Inn Fields, W.C., on Mondays, Wednesdays, and Fridays, from Feb. 19 to March 16 inclusive. Details will be published in the diary column of the *Supplement* week by week.

At an ordinary meeting of the Council on Feb. 8, with Sir Alfred Webb-Johnson, President, in the chair, resolutions of condolence were passed on the death of Sir Buckston Browne and Mr. Cecil A. Joll. Prof. Ernest Finch of Sheffield was elected a member of the Court of Examiners for a period of three years. The Association of Municipal Specialists was admitted to the joint secretariat under the auspices of the College at 45, Lincoln's Inn Fields. Mr. McAdam Eccles was reappointed a representative of the College on the British Social Hygiene Council for the year 1945. The Council received from Mrs. Braithwaite a portrait by Frank O. Salisbury of the late Leonard Ralph Braithwaite, F.R.C.S., formerly Vice-President of the College.

Diplomas of membership were granted to Diana M. Beyts, R. McK. Laslett, and W. D. G. Tellam, and to the 125 candidates whose names were printed in the report of the meeting of the Royal College of Physicians of London in the *Journal* of Feb. 10 (p. 203).

ROYAL COLLEGE OF PHYSICIANS OF LONDON

B. H. C. Matthews, C.B., ScD., will deliver the Oliver-Sharpey Lectures at the College on Tuesday, March 13, and Thursday, March 15, at 4 p.m. His subjects are "The Effects of High Altitude on Man," and "The Effects of Mechanical Stresses on Man," respectively.

ROYAL COLLEGE OF PHYSICIANS OF EDINBURGH

At a meeting of the College held on Feb. 6, with the President, Dr. A. Fergus Hewat, in the chair, Dr. W. F. T. Haultain was introduced and took his seat as a Fellow of the College, and Dr. D. R. Maitland and Dr. I. Douglas-Wilson were elected Fellows.

ROYAL COLLEGE OF PHYSICIANS OF IRELAND

At the monthly meeting of the College, held on Feb. 2, Dr. Robert Henry Micks, F.R.C.P.I., was elected King's Professor of Materia Medica and Pharmacy.

The following were admitted Licentiates and Members of the College: J. D. Kennedy, Anne McMahon, W. E. O'C. C. Powell, R. Wilson.

WESTMINSTER HOSPITAL MEDICAL SCHOOL

An examination for two entrance scholarships in anatomy and physiology will be held on March 6 and 7. Applications for further particulars should reach the secretary, Westminster Hospital Medical School, 17, Horseferry Road, S.W.1, not later than Feb. 26.

Medical Notes in Parliament

National Health Service

Dr. SUMMERSKILL inquired on Feb. 1 whether the Minister of Health could make a statement on the implementation of the recommendations contained in the White Paper on the Health Services. Mr. WILLINK said he was engaged in discussion of these proposals with representatives of the medical profession and others concerned, and was not yet in a position to make any statement.

Industrial Dermatitis

Mr. IVOR THOMAS asserted on Feb. 1 that medical referees now described by other names conditions which were formerly diagnosed as industrial dermatitis. He said patients were thus deprived of their rights under the Workmen's Compensation Acts. It was a common practice, he said, to describe as eczema or pustular pompholyx what had formerly been described as industrial dermatitis. Mr. HERBERT MORRISON said he was not aware there had been such a change. The statutory definition was "dermatitis produced by dust or liquids." He did not think there was a widespread feeling that this was "an insurance company ramp." He would look into any case which Mr. Thomas had in mind.

Research on Artificial Limbs

Major BRAITHWAITE asked the Minister of Pensions on Feb. 1 whether he had yet received any recommendations from the Departmental Committee on Artificial Limbs.

Sir WALTER WOMERSLEY: Yes, Sir. I have received an interim report which I will circulate with the official report. It recommends: (1) the appointment forthwith of an officer to undertake research and development work; and (2) the setting up of a standing advisory committee. I have accepted both recommendations, and Dr. A. W. J. Craft, whom I have selected for the research post, will shortly take up his new duties.

Medical Care during Sick Leave

Sir GEORGE JEFFREYS asked the Secretary of State for War whether he was aware that wounded officers and other ranks on sick leave were ordered to attend before medical boards at the hospital in which they were treated on their first return to this country, regardless of the distance from their homes or places of residence; and whether he would arrange in future for such officers and men to attend both for any necessary treatment and for medical boards at the nearest suitable hospital to the address at which they were residing while on sick leave. Sir JAMES GRIGG said that whenever possible medical boards on wounded officers and other ranks returning to this country were held before they were sent on leave, whether it was disembarkation leave, normal privilege leave, or, in the case of officers, sick leave. If at any time, owing to the numbers involved, this was not possible, the rule was that the patient should have his medical board at the hospital to which he was assigned for treatment. This should be as near to his home as possible, except in cases where he required special treatment and must be sent to a hospital with the appropriate facilities. He was aware that in a few cases this procedure had not been properly carried out, and that some men had been returned unnecessarily to the hospital where they were first treated on return to this country. Steps were being taken to prevent this.

Water Bill

The Water Bill, 1945, which was introduced in the House of Commons on Feb. 2, for the first time places on the Minister of Health the statutory duty of providing adequate water supplies and conserving of water resources throughout England and Wales. Among the main proposals of the Bill are the following: The Government's Central Advisory Water Committee is to be reconstituted as a statutory body. Surveys of bulk needs of large areas are to be continued where necessary in England and Wales by Joint Advisory Water Committees. The Minister of Health is to have power to call for information and statistics from all water authorities and other users of water. Existing local organization is to be retained, but the Minister's powers of direction and powers in cases of default are to be strengthened; amalgamation of undertakings and joint action are to be encouraged and, if necessary, enforced to secure efficiency and economy. Special steps are to be taken to protect water resources, especially underground ones, against misuse, waste, and pollution. In some instances a licence will be necessary in future before new wells can be made or existing ones enlarged. There will be penalties for pollution of water used for human consumption. Statutory undertakers are to be permitted, subject to proper safeguards, to take water from rivers and streams on reasonable conditions, and to acquire land by agreement or compulsorily. Local authorities are required to see that mains are brought wherever practicable to a suitable point which will enable a house to be connected at a reasonable cost, and that a *piped* supply is brought into the house.

Refresher Courses for Service Doctors

On Feb. 6 Sir E. GRAHAM-LITTLE asked the Minister of Health whether he would include in his scheme to provide refresher courses for serving medical officers, qualified and registered practitioners now serving in His Majesty's Forces not as medical officers. Mr. WILLINK: Yes, Sir.

Medical Officers of Health for Europe

On Feb. 6 Sir H. MORRIS-JONES asked the Minister of Health how many medical officers of health for counties, county boroughs, or urban district councils were at present being enrolled for work in the freed countries of Europe; how many had agreed to take up this work; and what arrangements were being made to look after the public health of this country in view of the present scarcity of medical personnel in civilian life. Mr. WILLINK said that 40 local authorities had been invited to consider the temporary release of medical officers for service with the civil affairs organizations in the liberated countries of Europe. So far 14 authorities had signified their consent. When a medical officer was being seconded in this way, arrangements for carrying on his public health duties in the area concerned were made by reorganization of the authority's medical staff or, in some instances, by transferring or sharing the services of a medical officer of another authority.

Fatal Smallpox Cases in Scotland

On Feb. 6 Mr. LEACH asked the Secretary of State for Scotland whether his Department made any inquiry into the deaths from vaccination or associated with vaccination performed during the smallpox outbreak in 1942; how many of such deaths were eventually discovered; the areas in which they occurred; and where the 10 deaths from vaccination or post-vaccinial encephalitis mentioned in the report on the Edinburgh smallpox outbreak occurred. Mr. JOHNSTON said that medical officers of his Department were in close and constant touch with medical officers of health during the period of this outbreak, and paid special attention to deaths associated with vaccination. During the period 21 such deaths were reported. Of these 10 were in Edinburgh, 5 in Fife, 4 in Glasgow, 1 in Lanarkshire, and 1 in Midlothian. The 10 deaths mentioned in the recently published report by the Edinburgh public health department all occurred in Edinburgh.

War Gratuities

Sir JOHN ANDERSON on Feb. 6 announced that the Government had decided to make provision for war gratuities to Service men and women after the war. The gratuity would depend on length of war service as well as on rank. Regular and ex-regular officers and men were included in the scheme. The basic rate for ratings and other ranks would be 10s. for each complete month of service and for the lowest rank of officer 25s. Women members of the Forces and nursing officers would, in general, receive two-thirds of the rate for corresponding male ranks.

Allocation of Doctors

On Feb. 7 Sir HENRY MORRIS-JONES asked what body or committee determined the priority between the three Services in regard to medical personnel; and whether it had recently had its attention directed to the danger of calling up any further medical men and women from civilian life, especially in rural areas. Mr. WILLINK said the allocation of doctors between the three Services and between those Services and the civil population was determined by the Government with the advice of the Medical Personnel (Priority) Committee presided over by Sir Geoffrey Shakespeare. This committee, which contains representatives of various branches of the medical profession as well as of the Services, had the subject under continuous review since it was constituted in 1941. The Government was alive to the aspect of the matter referred to in the second part of the question and to other relevant considerations.

Red Cross Visits to Japanese Camps

Mr. RICHARD LAW reported on Feb. 7 that the International Red Cross Committee had communicated a proposal from the Japanese Ministry of Foreign Affairs agreeing under conditions to visits by representatives of the International Red Cross to a prisoner-of-war hospital in Siam and a prisoner-of-war camp at Singapore. This did not cover more than a fraction of the camps in the southern areas, but the Japanese said they regarded it as a first step. The offer was conditional on representatives of the International Red Cross being permitted to visit Japanese subjects held in Allied countries. The British Government had replied that neutral representatives were permitted to visit all Japanese held in the British Empire.

Committee on Handicapped Children

Mr. R. A. BUTLER announced on Feb. 8 that he had appointed the following as an advisory committee on such matters relating to children requiring special educational treatment as he submitted to them or as they considered require investigation: Mr. Frederick Messer, M.P. (chairman), Prof. J. M. Mackintosh, Dr. A. A. E. Newth, and Mr. E. W. Woodhead (Director of Education, Kent). Mr. Butler added that to assist the committee in their consideration of any specific question under review he would from time to time appoint as additional members persons possessing special knowledge and experience of the particular category of handicapped children concerned.

Prevention and Treatment of Blindness

Mr. BEATTIE inquired on Feb. 8 whether the Secretary of State for Scotland had in view any extension of facilities for the prevention and treatment of blindness among the civilian population by amendment of the Prevention and Treatment of Blindness (Scotland) Act, 1938, or otherwise. Mr. JOHNSTON replied that provision for prevention and treatment of blindness had hitherto been made by Scottish local authorities, in varying measures, as part of their maternity and child welfare, school health, tuberculosis, and other services. A few authorities exercised their powers under the Act of 1938 to extend such provision to persons outside the scope of these special services. In certain areas also voluntary hospitals provided valuable facilities, and voluntary societies for the blind had done most useful work. As part of the National Health Service, it was contemplated that every person would have access, either through his general practitioner or through an appropriate local clinic service or otherwise, to all necessary specialist and hospital facilities required for all purposes, including those for the prevention and treatment of blindness.

Veterinary Education

Mr. R. S. HUDSON, replying on Feb. 8 to Col. Ropner, said improvement of veterinary education was regarded by the Government as a matter of national concern. A committee under the chairmanship of Dr. Loveday appointed by Mr. Johnston and himself had made recommendations for the improvement of veterinary education. These were under consideration by the Government and the various bodies concerned. The Government's financial contributions to medical and veterinary education were on different bases. Grants made to the two veterinary schools in England during the last four years amount to nearly £100,000. The Loveday Committee's recommendations envisaged substantially larger grants for the veterinary educational facilities they proposed. The Government did not contribute financially to the Veterinary Educational Trust, which was intended to supplement other resources.

Certificates of Incapacity

Mr. BEVIN on Feb. 8 said he had no power to prohibit employers from asking for medical certificates in support of absence. Special arrangements had been agreed with employers' organizations, trade unions, and the medical profession whereby a certificate in standard form could be obtained for 1s. Mr. TOM BROWN asserted that some employers, beside demanding the certificate, asked that the first bottle of medicine should be taken at the works after it had been received from the doctor. Dr. SUMMERSKILL asked why employers did not recognize National Health Insurance certificates as evidence of capacity. Mr. BEVIN replied that in some cases these certificates were not conclusive evidence.

Health in the Army.—On Jan. 30 Mr. VIANT asked the Secretary of State for War whether he was aware that a report on the health of the armed Services had been published in America, in which information on the amount of sickness in the American Army in 1942 and part of 1943 was given, based on official information; and whether his Department was in possession of statistics relating to disease in the Army in every theatre of war. Sir JAMES GRIGG said that he had not yet seen a copy of the report referred to. The answer to the second part of the question was in the affirmative. Owing to the shortage of staff it was unlikely that statistics about the health of the Army would be published until the war was over.

Accidents in Mines.—On Jan. 30 Major LLOYD GEORGE, replying to Mr. Bowles, said that 4,363 persons were killed at mines and 15,240 seriously injured from the beginning of the war to the end of 1944. Figures of minor injuries were not available for periods shorter than a year. During the five years ended December, 1943, the latest period for which figures were available, the total number of injuries involving absences from work of more than three days was 779,260. The number of fatal accidents last year was the lowest on record.

Calcium in Bread.—Col. LLEWELLIN, in reply on Jan. 31 to Mr. Martin, said calcium was the only extraneous ingredient included generally in the national loaf to-day which was not present in the pre-war loaf. As substantial advantages had been obtained from this addition he was not prepared to make available an alternative national loaf without it. Specialty breads containing no added calcium were available from most bakers.

Nutrition and Health of Miners.—Mr. ATTLEE told Col. Ropner on Feb. 1 that clinical and scientific inquiries into the health and nutritional state of miners had been and would continue to be made. He was taking up with the interested Departments the question whether a more general survey would be helpful, and if so by what agency it could best be conducted.

Notes in Brief

No change is contemplated in the present priority arrangements for milk so long as the consumption of milk by the general public has to be restricted. Col. Llewellin states the latest returns show that hospitals are getting more milk than they ever had before.

Exact figures for the incidence of hernia in the mining industry are not available, but only 1% of the miners applying to leave the industry on medical grounds advance hernia as the cause of disability.

Hospitals and institutions already have the highest priority for such nursing staff as they require urgently. During the nine months ended Sept. 30 the net increase in the number of nursing staff employed in hospitals and institutions was approximately 3,500, of which about 600 were part-time nurses.

Despite several approaches the Japanese Government has shown itself completely uninterested in exchanges of prisoners of war and has refused even to contemplate an exchange of sick and wounded. A small batch of telegrams from British prisoners of war in the Far East have been received recently. These are the first such telegrams to reach this country.

Forty-three claims for pensions made by widows of members of the Forces who have died of cancer have been allowed by Pensions Appeals Tribunals and 465 refused.

Seventeen Pensions Appeals Tribunals have been established. In the hearing of cases by them preference is given to the severely disabled.

There were 201 outbreaks of foot-and-mouth disease during the 12 months ended Feb. 1. Ninety-two were due to spread of infection from other animals. In 95 of the remaining outbreaks the disease first appeared among pigs, and in 23 the animals were owned by butchers.

Medical News

Technical fuel experts and members of local authorities will attend a joint conference of the Institute of Fuel and the National Smoke Abatement Society in London on Feb. 23. The conference will be opened by Major Gwilym Lloyd George, M.P., Minister of Fuel and Power.

The next meeting of the Association for Scientific Photography to be held on Saturday, Feb. 24, at 2.30 p.m. in Caxton Hall, Westminster, will be devoted to spectrography.

The Duchess of Kent, president of the National Association for the Prevention of Tuberculosis, has promised to attend a meeting of sanatorium matrons to be held in B.M.A. House on Thursday, March 1, at 3 p.m., when a Matrons' Section of the N.A.P.T. will be formed.

The Galton Lecture of the Eugenics Society, on "Eugenics in Retrospect and Prospect," will be delivered by Dr. C. P. Blacker to-day (Friday, Feb. 16) at 4.30 p.m., at 26, Portland Place, W. The lecture is open only to fellows and members and their guests.

The programme of medical films arranged by the Scientific Film Association will be shown at the Royal Society of Medicine (1, Wimpole Street, W.) on the fourth Wednesday in February, March, April, and May (*not* the fourth Thursday as previously announced). Each programme will be given at 5.30 p.m. and again at 8 p.m. and will consist of examples of a general interest introduction, a specialized illustration, a direct teaching film, and, lastly, a broad discussion of a subject. Application for admission should be made to the hon. secretary of the medical committee of the association, Dr. S. J. Reynolds, at 14, Hopton Road, London, S.W.16.

Doctors who have professional premises in another district from that in which they live are entitled to a professional vote for those premises. This applies with particular force in London to doctors with professional premises in the Marylebone parliamentary division. They should note, however, that under the new Registration of the People Act they will not be entitled to such a vote unless they first complete the necessary form, which can be obtained from their town hall or local council's office, and return it to the Local Electoral Registration Officer of their district before Feb. 28 next—that is, within ten days' time. Doctors who fail to do this will be unable to record their professional vote at the general election. It should also be noted that the husband or wife of an occupier of professional premises is no longer eligible for the vote for those premises.

EPIDEMIOLOGICAL NOTES

Discussion of Table

In *England and Wales* during the week whooping-cough fell in incidence by 160 cases, diphtheria by 68, dysentery by 82, and scarlet fever by 54; measles notifications rose by 887.

Only one case of diphtheria was reported from Caernarvonshire, Bangor M.B., where there were 55 cases in the outbreak last week. In Lancashire cases of diphtheria rose by 20. The lower incidence of whooping-cough was due mainly to the decrease in the south-west and south midlands; elsewhere there was little change. Scarlet fever notifications in Lancashire fell by 52. Notifications of measles were higher than last week by the following figures: Yorks West Riding 378, Worcestershire 199, Middlesex 157, Lincolnshire 128, Staffordshire 122, London 91; in Lancashire the incidence fell by 465, in Durham by 111, and in Nottinghamshire by 75.

There were 59 more cases of dysentery in the outbreak in Buckinghamshire, Aylesbury R.D., where 62 cases were reported last week. Only 19 cases were notified in Yorks West Riding, compared with 92 and 100 in the two previous weeks. The other large centres of infection were Essex 23, Gloucestershire 21, London 20, Lancashire 20, Suffolk 19, Middlesex 15, Kent 15, Derbyshire 13, Surrey 10, Northumberland 10.

In *Scotland* notifications of infectious diseases fell by the following figures: whooping-cough 75, scarlet fever 63, acute primary pneumonia 42, measles 18; notifications of diphtheria rose by 18, and of dysentery by 4. In Edinburgh cases of dysentery rose from 8 to 23.

In *Eire* the incidence of infectious diseases underwent little change during the week. Diphtheria is still widespread, the 95 cases involving forty-three registration areas.

In *Northern Ireland* the measles incidence continued to fall, there being 160 notifications, compared with 281 three weeks earlier.

Week Ending February 3

The notifications of infectious diseases in England and Wales during the week included: scarlet fever 1,401, whooping-cough 1,502, diphtheria 415, measles 16,039, acute pneumonia 1,366, cerebrospinal fever 76, dysentery 376, paratyphoid 2, typhoid 4. Deaths attributed to influenza in the great towns numbered 89.

No. 4

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended Jan. 27.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1945 (a)	(b)	(c)	(d)	(e)	1944 (Corresponding Week) (a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	81	7	16	5	2	60	3	14	2	2
Deaths		—	3				1	—		
Diphtheria	450	17	151	95	18	777	28	171	152	31
Deaths	4	—	1	2	—	19	—	6	2	2
Dysentery	295	20	79	—	2	176	27	56	—	1
Deaths				—	—				—	—
Encephalitis lethargica, acute	3	—	1	—	—	1	1	—	—	—
Deaths		—					1			
Erysipelas			44	5	6			62	4	3
Deaths		—					—			
Infective enteritis or diarrhoea under 2 years				6					6	
Deaths	46	5	9	12	5	48	10	12	14	2
Measles*	12,941	381	558	21	160	919	153	116	189	—
Deaths	12	—	—	—	1	1	—	—	—	—
Ophthalmia neonatorum	47	2	15	—	1	65	2	24	—	—
Deaths										
Paratyphoid fever	3	2	1 (B)	—	—	4	—	2	—	—
Deaths	—	—	—	—	—	—	—	—	—	—
Pneumonia, influenzal†	1,397	106	14	5	5	1,079	88	35	19	11
Deaths (from influenza)	87	11	3	1	4	104	16	6	2	1
Pneumonia, primary			302	20				276	7	
Deaths		69		23	21		71		20	12
Polio-encephalitis, acute	—	—				2	—			
Deaths		—					—			
Poliomyelitis, acute	7	—	—	—	—	4	—	2	—	—
Deaths		—					—			
Puerperal fever		—	10		—		7	16		—
Deaths										
Puerperal pyrexia‡	141	9	19	1	1	167	10	12	4	1
Deaths		1					—			
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	1,510	49	182	10	48	1,928	138	217	26	71
Deaths	2	—	—	—	—	3	—	—	—	—
Smallpox	—	—	—	—	—	—	—	—	—	—
Deaths				—	—				—	—
Typhoid fever	3	—	2	4	—	2	1	2	16	5
Deaths	—	—	—	2	—	—	—		—	—
Typhus fever	—	—	—	—	—	—	—	—	—	—
Deaths				—	—				—	—
Whooping-cough*	1,625	66	115	42	10	2,104	177	133	64	15
Deaths	14	1	2	3	—	13	3	2	3	1
Deaths (0–1 year)	460	50	68	58	31	433	67	69	61	20
Infant mortality rate (per 1,000 live births)										
Deaths (excluding still-births)	6,739	922	815	322	185	5,346	840	723	282	137
Annual death rate (per 1,000 persons living)			18·5	20·8	§			16·6	18·4	§
Live births	6,202	704	814	258	271	6,747	851	888	411	280
Annual rate per 1,000 persons living			16·3	16·6	§			18·1	26·8	§
Stillbirths	198	18	27			220	25	35		
Rate per 1,000 total births (including stillborn)			32					38		

* Measles and whooping-cough are not notifiable in Scotland, and the returns are therefore an approximation only.

† Includes primary form for England and Wales, London (administrative county), and Northern Ireland.

‡ Includes puerperal fever for England and Wales and Eire.

§ Owing to evacuation schemes and other movements of population, birth and death rates for Northern Ireland are no longer available.

Letters, Notes, and Answers

All communications with regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, LONDON, W.C.1. TELEPHONE: EUSTON 2111. TELEGRAMS: *Aitiology Westcent, London.* ORIGINAL ARTICLES AND LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone unless the contrary be stated.

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MEMBERS' SUBSCRIPTIONS should be sent to the SECRETARY of the Association. TELEPHONE: EUSTON 2111. TELEGRAMS: *Medisecra Westcent, London.*

B.M.A. SCOTTISH OFFICE: 7, Drumsheugh Gardens, Edinburgh.

ANY QUESTIONS?

Calamine Lotion

Q.—*Calamine is impure zinc oxide. Have the impurities any merit apart from the cosmetic effect of the pink colour? What is the pigment? Why is calamine mixed with equal parts of pure zinc oxide in many formulae?*

A.—Calamine may or may not contain zinc oxide, being chiefly zinc carbonate to which a small amount of iron oxide is added for its cosmetic effect. Its addition to the calamine lotion is therefore partly as a colouring matter and partly to produce a suitable concentration of a zinc salt.

Acquired Immunity

Q.—*Where an acquired immunity is life-long, do the same molecules of antibody remain in the blood indefinitely? If not, what is the stimulus to the formation of new ones?*

A.—Antibodies, once formed as globulin, do not persist for long in the circulation, as is shown by the temporary immunity of a few weeks' duration conferred on a child who is passively protected with homologous convalescent measles serum, or by the infant who remains resistant to the common childhood fevers during the first few months of life, presumably because of the passive transfer of antibody from the mother via the placenta. Where immunity is actively acquired and lasting, as happens with many bacterial and virus infections, it does not necessarily follow that there is demonstrable antibody in the patient's blood. However, in yellow fever, and probably also in measles, the life-long immunity is associated with circulating antibody, and no one has yet given a satisfactory explanation of this phenomenon. There are two views: either the antigen persists in or on the antibody-forming cells, presumably the reticulo-endothelial system, for many years acting as a sort of template; or these cells, once having received the imprint of a particular antigen, go on producing specific antibodies and pass on this property to their descendants, even in the absence of antigenic stimulus. Persistence of the infectious agent is known to occur in trypanosomiasis, rickettsial infections, and herpes labialis, but there is no epidemiological evidence for its occurrence in yellow fever or measles or typhoid. Thus there seems no escape from the view that life-long immunity depends on some property acquired and transmitted by the antibody-producing cells in the absence of any antigenic stimulus. The interested reader should read the excellent review, *Production of Antibodies*, by F. M. Burnet and others (London, 1941).

Haemin and Anaemia

Q.—*During a discussion it was suggested that haemin might be used in the treatment of microcytic hypochromic anaemia. We were unable to adduce any theoretical evidence against such a form of treatment, but would be grateful if you would consider our reasoning [omitted here] and point out flaws in it.*

A.—The scheme for the synthesis of haemin has certain weaknesses. Although the ionic form in which iron is absorbed from the intestine is still a matter under investigation, it would seem from existing evidence that it is absorbed chiefly in the ferrous state. In fact metabolic reactions within the stomach tend to maintain iron in this condition. Whether iron compounds can react with haematin or protoporphyrin in the plasma is doubtful. Neither haematin nor protoporphyrin has been detected in normal plasma; small amounts of protoporphyrin have been found in reticulocytes. It is difficult to visualize a mechanism whereby a reaction between haematin (or haemin) and globin, taking place in the plasma, would lead to haemoglobin. Globin is not a normal constituent of plasma, and haematin in plasma would probably form methaemalbumin (ferriprotoporphyrin albumin). The reaction between haemin and globin suggested in the question would not lead to a naturally occurring iron-porphyrin-globin pigment. Haematin in combination with globin gives methaemoglobin (ferriprotoporphyrin globin), whereas haem gives haemoglobin (ferroprotoporphyrin). In both these compounds the valency bonds of the iron atom have been shown, from measurements of their magnetic susceptibility, to be essentially in the ionic condition; in haemoglobin Fe^{++}, and methaemoglobin Fe^{+++}. In oxyhaemoglobin the bonds are essentially covalent and the iron atom is linked to the pyrrole nuclei in a manner similar to that in the formula in question.

Haemin would not be an effective substitute for iron salts in the treatment of microcytic anaemia. Given orally, haemin suffers the same fate as the haem of haemoglobin in the intestine. It is decomposed into protoporphyrin and iron. The intravenous administration of haemin would be difficult, since haemin is not soluble in solvents at a *p*H near to that of blood. The best solvent for haemin is sodium hydroxide, and the use of alkaline solutions of *p*H 8 or is clearly not to be recommended for intravenous administration.

Sulphanilamide per Rectum

Q.—*How should sulphanilamide be given per rectum? In the M.R.C. Memorandum on the medical use of the sulphonamides, page 15, there are directions for giving sulphanilamide per rectum which beat even the brain of a mathematical friend. According to our deductions, one could not give a satisfactory dose by this method. I would be glad if you could throw some light on the subject.*

A.—Why should the questioner and his friend be so baffled by these simple directions? They are that a saturated solution of sulphanilamide (0.8%) be prepared, of which "the required quantity is brought up to a total volume of 300 c.cm., if necessary, by admixture with 1% glucose in normal saline. . . ." If no such additions were considered "necessary" the dose would be 2.4 g.—given four hourly, is this not a "satisfactory dose"? This method of administration is nevertheless not to be recommended, owing to slow and sometimes incomplete absorption; it should rarely be necessary.

Common Salt for Cleaning Teeth

Q.—*A school has instituted the practice of cleaning teeth with common salt instead of toothpaste. Has this any advantages or disadvantages?*

A.—Common salt is excellent for cleaning teeth and has been in use for generations for this purpose. It has the great advantage of being cheap and in plentiful supply, but the taste is an acquired one and many people do not like it. It matters little what dentifrice is used so long as the teeth and gum margins are brushed conscientiously at least twice daily, and common salt (or common soap) is as good as, if not better than, the proprietary articles, though it may not be as pleasant or attractive. It is encouraging to hear of a school insisting on a routine of this nature, for the dental health of the grown man depends very largely on the habits acquired in his youth.

Estimating Antibodies

Q.—*What is the technique for estimating antibodies, specific and non-specific?*

A.—There is a variety of methods for testing for the presence of specific antibodies. The best-known is the agglutination reaction which occurs as bacterial clumping and sedimentation when a suspension of the micro-organism suspected of causing the infection is mixed with suitable dilutions of the serum of the infected patient. Antibodies may take a week or more to appear after onset of the clinical infection, so that, in typhoid fever, for example, the Widal test, which is an agglutination reaction, will give no positive information before 7 to 10 days. Another common method of estimating antibody is the complement-fixation test, of which the Wassermann reaction is an example. Or antibody may be demonstrated by precipitation reaction, or the animal protection test, or other specialized techniques suitable for particular infections. Details of the usual methods for estimating antibodies are to be found in any bacteriological textbook, but these tests should not be undertaken by persons who have not had a laboratory training.

What does the questioner mean by non-specific antibody?

Treatment of Ascariasis

Q.—*Roundworms are extremely common in this area (Bombay Presidency). Santonin has to be given very frequently. Under the existing sanitary conditions, formation of roundworms cannot be prevented. What is the safe dose for repeated administration?*

A.—In adequate dosage santonin is always liable to cause toxic manifestations, sometimes very severe; there is therefore no safe *effective* dose. Oil of chenopodium is rather more efficient, but also is toxic. A good method of treating ascariasis in adults, which in the area mentioned is likely to be associated with hookworm infestation, is to give ol. chenopodii 0.3 c.cm. with tetrachlorethylene 2.7 c.cm., followed in an hour or so by a sharp saline purge. The treatment may be given, with adequate spacing, several times a year

Oculogyric Crises in Encephalitis Lethargica

Q.—Is there any effective method of controlling the severity and frequency of the oculogyric crises which are such a distressing symptom of chronic encephalitis lethargica?

A.—Oculogyric crises sometimes respond well to the ordinary treatment of encephalitic Parkinsonism; for example, tincture of stramonium pushed to the limit of tolerance or a mixture such as the following:

℞ Hyosc. hydrobrom.	.. .. ..	gr. 1/200
Tinct. stramon.	.. ..	♏ 15
Tinct. bellad.	.. ..	♏ 10
Sod. brom.	.. ..	gr. 10
Aq.	.. ..	.. ad oz. 1/2

Sig.: 1/2 oz. t.d.s.

Amphetamine sulphate in doses of 5 mg. three times a day and 10 mg. at the onset of an attack may also help. Artificial pyrexia might be tried for a patient who responds to nothing else. In some cases, unfortunately, the spasms recur in spite of all treatment.

Estimating Osmotic Pressure

Q.—Would you describe the most delicate method of noting changes in osmotic pressure, or tell me where a description can be found?

A.—Direct methods for estimating osmotic pressure are laborious and difficult, requiring a well-equipped laboratory. Estimation of vapour pressure and depression of freezing-point are the chief indirect methods. Chapter 41 in J. Reilly and W. N. Rae's *Physico-chemical Methods*, 1933, published by Methuen (London), or M. Findlay's *Osmotic Pressure*, 1919, published by Longmans (London) will be helpful.

Case of Peritoneal and Pleural Effusion

Q.—A man aged 29, with no past illnesses, on June 1, 1944, had diffuse abdominal pain and pain on micturition. He went to Normandy on "D" day, but 15 days later had to be sent home with a greatly distended abdomen. A large amount of yellow fluid with a fibrin deposit was removed: protein, 600 mg. per 100 c.cm.; no organisms. Later he developed small bilateral pleural effusions, which soon absorbed. Ascites and pleural effusions have not recurred. He feels well except for a dragging pain on standing. He is apyrexial, and sedimentation rate is 14 mm. in one hour. Suggestions as to the probable diagnosis will be welcomed.

A.—It is difficult to offer a satisfactory diagnosis. The presence of fibrin suggests an inflammatory exudate. Possibilities are a non-suppurative acute peritonitis due to a leaking perforation, or less probably a pneumococcal or streptococcal infection. On the other hand, the low protein content of the effusion suggests a transudate. This might be due either to a constrictive pericarditis—the most satisfactory explanation of the simultaneous involvement of the pleura—or, less probably, a thrombosis of the portal vein. If constrictive pericarditis is present, the heart may appear normal but the venous pressure should be high. It would be appropriate to examine by *x* rays the heart and pericardium; the lower oesophagus for varices; and the stomach and duodenum for ulcer. If these examinations are negative, the function of the liver should be studied.

Urinary Antisepsis

Q.—At a recent discussion on pyelitis it was stated that in the "sulpha" treatment the urinary concentration of the drug was of greater importance than that in the blood; consequently smaller doses were advised. Upon what evidence is this opinion based? Is there reliable statistical evidence to show that recurrences are greater or less after adequate treatment with sulphonamide, as compared with the alkaline treatment alone?

A.—This is not an opinion; it is a fact that the action of any urinary antiseptic depends on its concentration in the urine. If this were not so, there would be no urinary antiseptics except the sulphonamides and penicillin, since no others have any action in the blood and tissues. The urinary concentrations of the several sulphonamides required to inhibit the growth of the various bacteria commonly causing urinary-tract infections have been determined by appropriate *in vitro* methods by H. F. Helmholz (see, for instance, *Proc. Mayo Clin.*, 1940, **15**, 651, for his data on sulphathiazole), and concentrations well in excess of those necessary for suppressing the more susceptible bacteria can be attained on very moderate dosage.

We know of no statistics of the frequency of recurrence after different forms of treatment. The main difference between sulphonamide and alkaline treatment is that the former will cure a large majority of suitable cases in a week, whereas the latter leaves the cure to Nature.

*** Helmholz's article was commented on in an annotation in the *B.M.J.* of April 5, 1941 (p. 521). Previous comments on his work on urinary infections appeared in the *B.M.J.*, 1937, **1**, 396; 1937, **2**, 89; 1938, **1**, 459.

Sodium Cacodylate

Q.—Is sodium cacodylate of any use in the treatment of chilblains, and if so in what dosage should it be prescribed?

A.—The cacodylates were introduced some fifty years ago as almost a specific remedy for certain conditions, such as tuberculosis, pernicious anaemia, and leukaemia. Sodium cacodylate contains about 62% of arsenious acid; it has proved an entirely disappointing remedy and is not recommended in the treatment of chilblains.

Iodine as Contraceptive

Q.—I have heard that in Russia a common method of contraception is the painting or swabbing of the cervix with tinct. iodi mitis immediately after each period, thus avoiding the use of pessaries, etc. Is this so, and what are the advantages and disadvantages of the method?

A.—The method in question involves the introduction of iodine *into the uterine cavity*, rather than its application to the cervix. The object is to damage the endometrial surface to such an extent that the implantation of a fertilized ovum is either prevented, or is so disturbed that an early abortion results. It has been employed mostly in Russia and Germany. A 10% solution of iodine, or a mixture of equal parts of tincture of iodine (? fortis) and glycerin, is used, and is carried to the uterine cavity by cotton-wool mounted on a probe. The cervix may need to be dilated first. As a rule, the treatment is carried out once a month, before or after menstruation. A modification of this method is to *inject* a small amount of iodine solution into the uterus, and it would appear that this technique is employed not only to prevent implantation, but to induce abortion of an already established pregnancy.

The repeated introduction of irritant chemicals into the uterus in this way is to be condemned. If it is to be effective, there must be injury to the epithelium, and this in turn may be followed by infection. Moreover, the infection may not be limited to the uterus, and cases of pelvic cellulitis and acute salpingitis are recorded—although in some of these cases it may be that the woman was already pregnant before treatment. Permanent sterility might result, and it has been suggested that there is increased likelihood of ectopic pregnancy. The actual introduction of the iodine solution causes uterine spasm, and is painful; vomiting and collapse may occur. Not only is this method of contraception (or rather induction of abortion) dangerous, but it is unreliable, and there is little if anything to be said in its favour. The details of the technique are described by E. J. Kvater in *Contraceptive Methods and their Technique* (1926), and the method is discussed by C. A. Selitzky, chief of the gynaecological department of the Moscow State Hospital, in *Contraceptive Methods in the Light of Modern Science* (1929). The latter concludes that the use of such methods is unjustifiable. These pamphlets are published by the State Department of Health in Moscow, and both are referred to by Antoinette F. Konikow in her book, *Physicians' Manual of Birth Control* (1931), page 114.

Flexor Spasms in Octogenarian Tabetic

Q.—An octogenarian tabetic, otherwise healthy, suffers from spasticity of his right leg. When he tries to sleep and conscious control is relaxed, his right leg assumes a position of extreme flexion at both hip and knee. He is able to sleep only in this uncomfortable posture, with the right thigh pressed close to the abdomen and his heel almost touching his buttock. Sedative drugs (short of morphine, which has not been used) have no effect. No splint or other restrictive device can be tolerated. Is there any medical or surgical procedure likely to give relief?

A.—Spasticity is not part of the clinical picture of tabes, so that in this case there must be an associated lesion of the pyramidal tract, presumably syphilitic. Flexor spasms such as those described are a feature of paraplegia in flexion, though rarely confined to one lower limb. If sedation is ineffective the only possible treatment would be an extensive division of the posterior roots from the lower dorsal level downwards on the affected side, to interrupt the reflex arc, but such a serious operation would be out of the question in an octogenarian.

Sudanophobic Units

Q.—In the JOURNAL *of Aug. 12, 1944 (p. 212), there is an article by Hemphill and Reiss which mentions "sudanophobic units" of "corticotrophic hormone." Sudanophobic units are quite new to me, and I should appreciate information about them.*

A.—This method of standardization of corticotrophic hormone is based on the ability of the hormone under test to produce regeneration in the sudanophobic zone of the adrenals of the rat after hypophysectomy. It is fully described by M. Reiss, J. Balint, and F. Oestricher (*Endokrinologie*, 1936, **18**, 1). The method was "rediscovered" and has been described by H. M. Evans and Choh Hao Li (*Endocrinology*, 1943, **33**, 261).

INCOME TAX

Amount of Tax Payable

"COLONY" inquires what tax he would have to pay in this country on the income shown below, assuming the continuance of present allowances and rates of tax.

*** The income-tax year ends on April 5. If "Colony" comes to this country on, say, December 5, 1945, the position for the first two years or so will be approximately as follows:

(*a*) 4 months to April 5, 1946—tax payable, say £45.
(*b*) Year to April 5, 1947—

	£	£
Earned income:		
8 months to Dec. 5, 1946 = 2/3 of £1,100 ..	733	
4 „ „ April 5, 1947 = 1/3 of £500 ..	167	
		900
Allowances, 1/10 of £900	90	
Married allowance	140	
"Children" allowance	100	
		330
		570

	£ s. d.
£165 at 6s. 6d. ..	53 12 6
£405 at 10s.	202 10 0
£570 Total tax	256 2 6

(*c*) Year to April 5, 1948:

	£	£
Earned income	500	
Investment income	39	
		539
Allowances:		
Earned income 1/10 of £500	50	
Married allowance	140	
"Children" allowance	100	
		290
		249

	£ s. d.
£165 at 6s. 6d. ..	53 12 6
£84 at 10s.	42 0 0
£249 Total tax	£95 12 6

Post-war credit would be due—i.e., (*a*) £18, (*b*) £50, and (*c*) £36. The lump-sum payment arising from partial conversion of the pension is not taxable, but any income arising from the investment of it would, of course, be taxable. It has been assumed that "Colony" can establish the fact that some War Bonds standing in his name are held by him in trust for his sons, and that the interest thereon is therefore not liable to tax as being his income.

LETTERS, NOTES, ETC.

"Structural" instead of "Organic"

Dr. P. E. DIPPLE (Sawbridgeworth, Herts) writes: It has occurred to me for some time that a point in the accepted cataloguing of diseases needs revision. I refer to the main division of all diseases into the groups of either organic or functional. If we are to retain the term "organic" then surely functional diseases should be termed "inorganic." May I suggest that what we now refer to as organic should be entitled "structural" diseases, this term implying some change of structure, either macroscopical or microscopical, or both, and the term "functional" to be retained in its present usage to label those diseases where no structural changes can, *at present*, be demonstrated. Such a nomenclature would appear to me to be more logical than that now in use. Surely functional diseases are also organic inasmuch as the function of one or more *organs* is involved.

Demobilization and the E.M.S.

"1939 VOLUNTEER" writes: I am greatly surprised at the sense of grievance evident in the letter under this heading in your issue of Oct. 7 (p. 482) just to hand. I think that if your correspondent will answer honestly the following questions he will probably realize that neither he nor his fellow members of the E.M.S. have any legitimate grievance. (1) What does he mean by "virtual" conscription? (2) Did he volunteer for service with the armed Forces before his "conscription" into the E.M.S.? If he did not do so, and had to be conscribed into the E.M.S., what work did he propose doing during the war? (3) What disadvantages (domestic, educational, or financial) has he suffered by being a member of the E.M.S.? Has he gained any advantages in these respects over his contemporaries serving in the armed Forces? While the proposed scheme of demobilization of the armed Forces depends on age and length of service it should be realized that this is only so that thereby the scheme becomes workable; but morally, factors less tangible and not so easily measured are of more importance—viz., hardship suffered and sacrifices made. No one will deny how great has been the amount of useful work done by the E.M.S., but surely it cannot be claimed that this has involved serious hardship on its members. In conclusion I would like to suggest that if there should be any difficulty in releasing medical officers from the armed Forces before members of the E.M.S. are released, then members of the E.M.S. (provided they are under the age of, say, 40) should be conscribed to replace those in the armed Forces. In this way it may be possible to mitigate the disadvantages (especially educationa which will otherwise face the Service medical officer in the inevitab post-war scramble for a livelihood.

Rocking Movements in Sleep

A. B. C. writes: With regard to the question on this subject the *Journal* of Dec. 2, 1944 (p. 744), and the letter appearing in issue of Dec. 23 (p. 842), it may interest your correspondents if cite the case of my younger daughter. She is now 12½ and abov the average in intelligence, and she has always been a good sleepe like the rest of her family. From the age of about 3 months un quite recently she has been in the habit of vigorously rocking hers to sleep, both when first settling down for the night and agai whenever sleep became light for any reason. When this occurs sh is usually lying on her back, never on her face, often with her hand behind her head so that her projecting elbows act as a sort o oscillating fly-wheel, causing her head and shoulders to rock violently from one side to the other. When she was quite sma the violence of this rocking shook the cot or bed, causing it t creak, and thereby disturbing others, but now that she is older th rocking is less frequent and much less violent. She is trying t overcome the habit, and has, I think, practically succeeded, but a the rocking occurs only when already asleep, she has found i difficult to exercise conscious control over it. She is now at a boarding school, and only once recently has her rocking disturbe the other girls. I have not seen or heard it myself for some tim now. There is no familial history of rocking, and her elder siste never did it. She was never rocked in her cradle by a nurse durin infancy, but she seemed to discover the advantages of rocking fo herself. She seems to have a well-balanced personality and to b normal both physically and mentally. Personally I do not regar the habit as in any way pathological—rather, perhaps, as a mani festation of a somewhat original and independent spirit! But i used to be a terrible nuisance!

Aetiology of Erythema Nodosum

Dr. EVA MCCALL (Sunninghill, Berks) writes: I have read wit much interest Prof. Bruce Perry's paper (Dec. 30, p. 843), for to m it has a personal application, which, in my case at least, seems t point to a rheumatic origin of this condition. When I was a schoo girl I had an attack of erythema nodosum, and can still reca after all these years the red nodules over the tibiae, accompanie by acute pain and tenderness in the legs and inability to walk. Th point I wish to emphasize is that I inherited the rheumatic diathesis my mother having had an attack of rheumatic fever as a youn woman, with a resulting endocarditis. I myself am a rheumati subject, and have suffered for many years from the different mani festations of rheumatism, fibrositis, neuritis, and arthritis. In m case there is no evidence whatever of tuberculous infection.

Passive Hyperventilation

Dr. S. CONCHUBHAIR (Dublin) writes: The inquiry of B. (Dec. 30, p. 876) reminded me of a method I learnt from the la Dr. P. J. Keogh of Dublin of using passive hyperventilation f the same (or a similar) purpose. When about to induce gener anaesthesia with Clover's inhaler the ether container is filled an the rebreathing bag attached. The facepiece is then applied an the patient told to breathe in and out steadily and strongly. With a couple of minutes the respiration deepens and becomes somewh stertorous, and the patient then becomes drowsy. When depth respiration and duration of hyperventilation are judged sufficie the air valve is rotated fairly rapidly, to "3/4" at once, and then more slowly to "full." The patient then very rapidly becom sufficiently anaesthetized for such procedures as tonsillectom Almost never is there any coughing after the ether is turned o and breath-holding is impossible. The quantity of ether used considerably smaller than with the more usual method of inductio On being questioned later patients do not remember having notic any of the unpleasant sensations usually experienced when gettin ether. I do not know whether this method is widely know or has been published, but I send it to you in the hope that, if has not, you may be able to give it a little space.

Recurrent Phlebitis

Dr. A. J. COLBY TINGEY (Epsom) writes: Recurrent phlebi (*Journal*, Feb. 3, p. 171) of the infective type is sometimes a sequel fungus infection of the toes. Virulent streptococci may enter the bo through the fissures in the interdigital spaces met with in this con tion. Although the questioner mentioned that the phlebitis was co fined to the veins of the lower limbs in the case referred to, writer of the reply, giving a list of possible infective foci, did suggest that the toes should be inspected. Unless this point recei attention the patient might be subjected to extraction of te exploration of the nasal sinuses, appendicectomy, cholecystecto and prostatectomy without deriving any benefit. I have had p sonal experience of this form of phlebitis, which incapacitated for weeks at a time.